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GEORGE D. NORDENHOLT, Director

DIVISION OF MINES  
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY

State Mineralogist

San Francisco]

BULLETIN No. 116

[Sept. 1938]

CALIFORNIA  
MINERAL PRODUCTION  
AND  
DIRECTORY OF MINERAL PRODUCERS  
FOR 1937

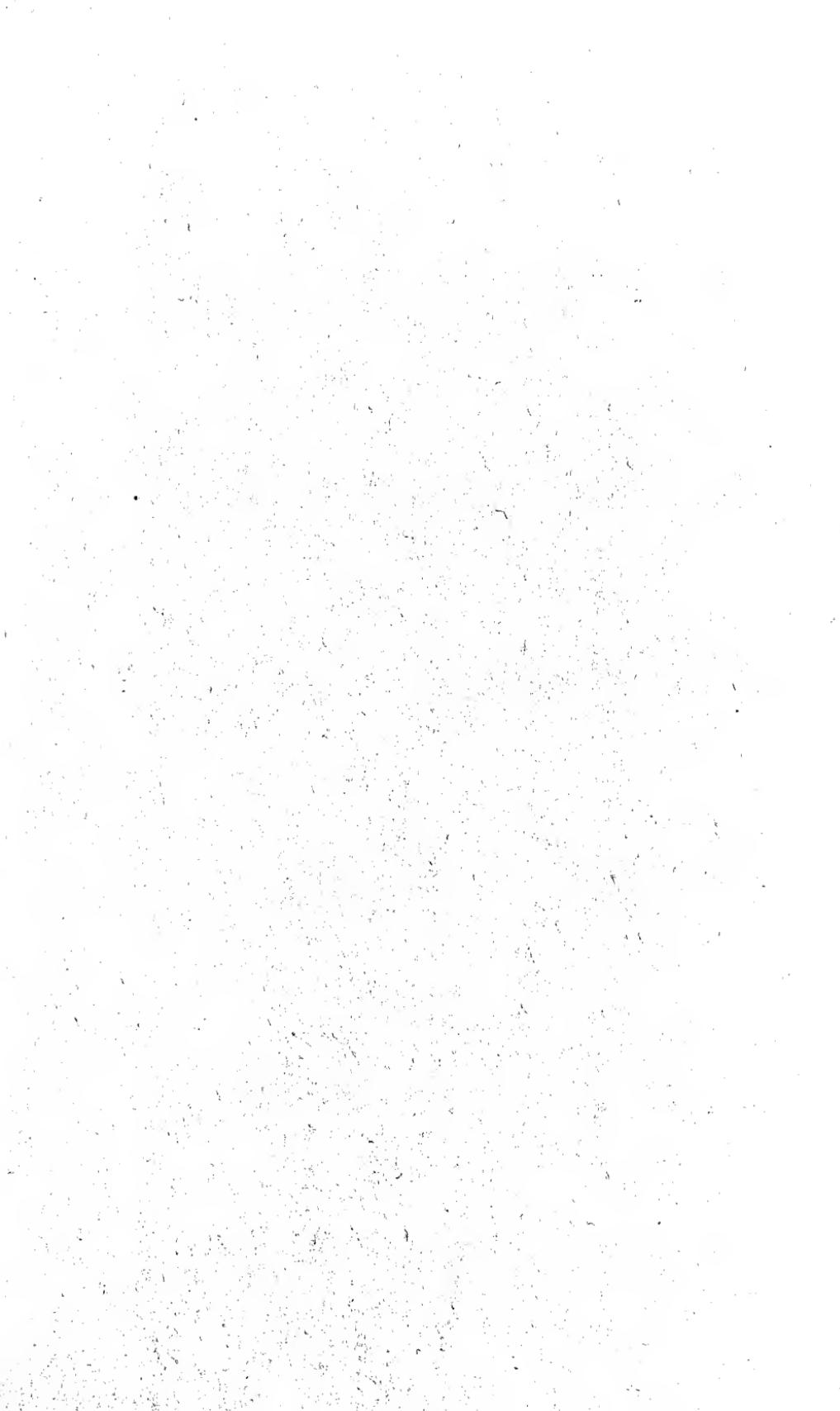


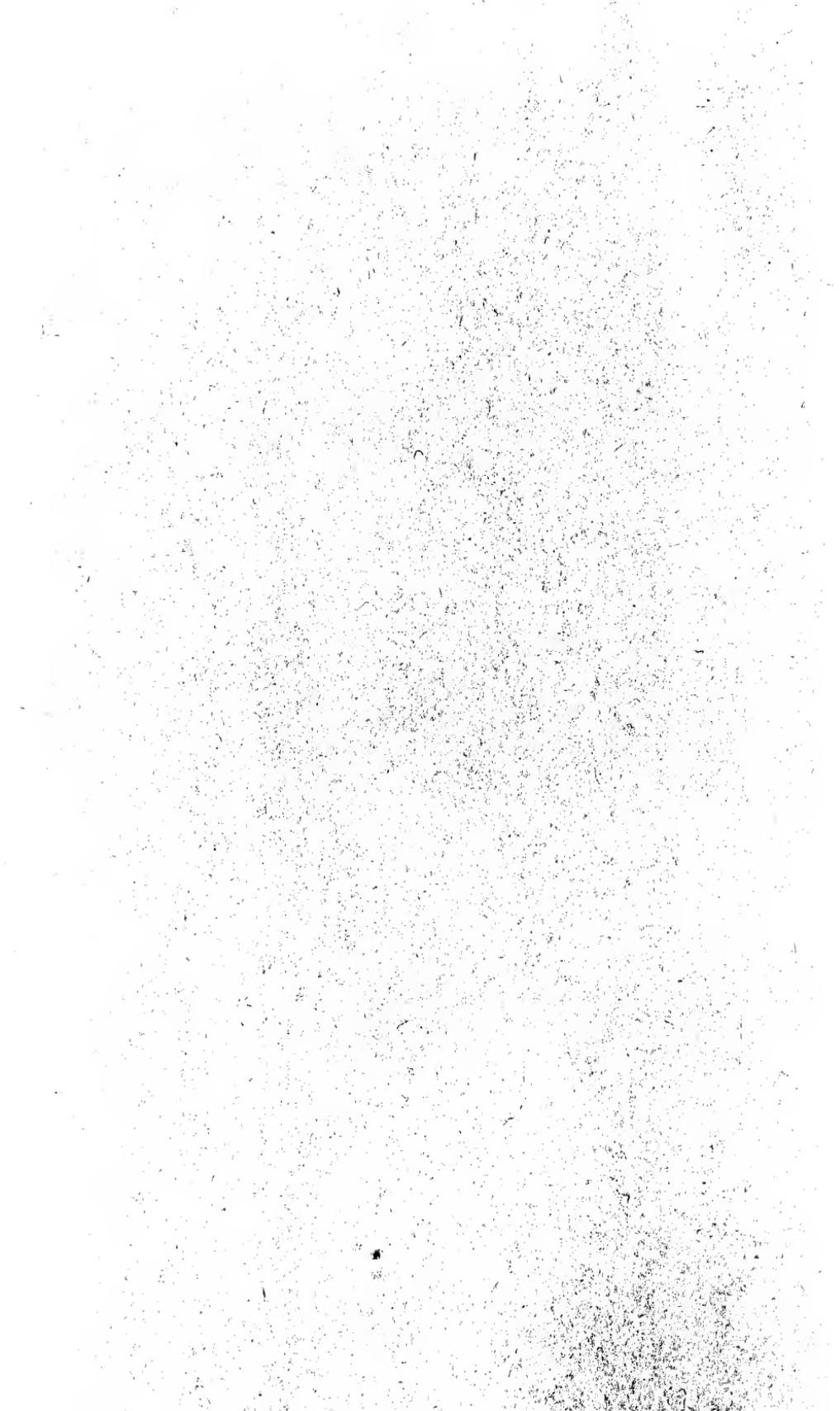
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CALIFORNIA  
MINERAL PRODUCTION  
AND  
DIRECTORY OF MINERAL PRODUCERS  
FOR 1937

By  
HENRY H. SYMONS



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## CONTENTS

|  | Page |
|--|------|
| LETTER OF TRANSMITTAL -----  | 7    |
| INTRODUCTION -----   | 9    |
| <br><b>CHAPTER I</b>   |      |
| SUMMARY OF THE MINERAL INDUSTRY IN CALIFORNIA DURING THE<br>YEAR OF 1937-----                                  | 11   |
| TABULATION OF THE MINERAL PRODUCTION, SHOWING COMPARATIVE AMOUNTS<br>AND VALUES—1936 AND 1937-----             | 11   |
| TABLE SHOWING COMPARATIVE MINERAL PRODUCTION OF THE VARIOUS COUN-<br>TIES IN CALIFORNIA FOR 1936 AND 1937----- | 13   |
| TOTAL PRODUCTION, 1887-1937-----   | 14   |
| <br><b>CHAPTER II</b>  |      |
| FUELS (HYDROCARBONS)—  |      |
| INTRODUCTORY -----   | 15   |
| COAL -----   | 15   |
| NATURAL GAS -----  | 16   |
| PETROLEUM -----  | 19   |
| <br><b>CHAPTER III</b>   |      |
| METALS—  |      |
| INTRODUCTORY -----   | 26   |
| ALUMINUM -----   | 26   |
| ANTIMONY -----   | 26   |
| ARSENIC -----  | 27   |
| BERYLLOIUM -----   | 27   |
| BISMUTH -----  | 28   |
| CADMIUM -----  | 28   |
| CHROMITE -----   | 28   |
| COBALT -----   | 30   |
| COPPER -----   | 30   |
| GOLD -----   | 31   |
| IRIDIUM. ( <i>See</i> Platinum)  |      |
| IRON -----   | 37   |
| LEAD -----   | 38   |
| MANGANESE -----  | 39   |
| MOLYBDENUM -----   | 40   |
| NICKEL -----   | 41   |
| OSMIUM. ( <i>See</i> Platinum.)  |      |
| PALLADIUM. ( <i>See</i> Platinum.)   |      |
| PLATINUM -----   | 42   |
| QUICKSILVER -----  | 43   |
| SILVER -----   | 46   |
| TIN -----  | 48   |
| TITANIUM -----   | 48   |
| TUNGSTEN -----   | 48   |
| VANADIUM -----   | 50   |
| ZINC -----   | 50   |
| <br><b>CHAPTER IV</b>  |      |
| STRUCTURAL MATERIALS—  |      |
| INTRODUCTORY -----   | 51   |
| ASPHALT -----  | 51   |
| BITUMINOUS ROCK -----  | 52   |
| BRICK AND HOLLOW TILE -----  | 53   |
| CEMENT -----   | 54   |
| GRANITE -----  | 55   |
| LIME -----   | 57   |
| MAGNESITE -----  | 58   |
| MARBLE -----   | 59   |
| ONYX AND TRAVERTINE -----  | 60   |
| SANDSTONE -----  | 61   |
| SERPENTINE -----   | 61   |
| SLATE -----  | 62   |
| STONE—MISCELLANEOUS -----  | 63   |
| Paving Blocks -----  | 64   |
| Grinding-Mill Pebbles -----  | 65   |
| Sand and Gravel -----  | 65   |
| Crushed Rock -----   | 66   |

|                                      | CHAPTER V | Page |
|--------------------------------------|-----------|------|
| INDUSTRIAL MATERIALS—                |           |      |
| INTRODUCTORY                         | 69        |      |
| ASBESTOS                             | 70        |      |
| BARITE                               | 70        |      |
| BENTONITE (Fuller's Earth)           | 71        |      |
| CALCIUM SILICATE                     | 72        |      |
| CARBON DIOXIDE GAS                   | 73        |      |
| CLAY—POTTERY                         | 73        |      |
| DIATOMITE                            | 77        |      |
| DOLOMITE                             | 78        |      |
| FELDSPAR                             | 78        |      |
| FLUORSPAR                            | 79        |      |
| GEMS                                 | 79        |      |
| GRAPHITE                             | 80        |      |
| GYPSUM                               | 81        |      |
| LIMESTONE                            | 82        |      |
| LITHIA                               | 83        |      |
| MICA                                 | 84        |      |
| MINERAL PAINT                        | 84        |      |
| MINERAL WATER                        | 85        |      |
| PHOSPHATES                           | 87        |      |
| PUMICE AND VOLCANIC ASH              | 87        |      |
| PYRITES                              | 88        |      |
| SHALE OIL                            | 88        |      |
| SILICA (Sand and Quartz)             | 89        |      |
| SILLIMANITE-ANDALUSITE-KYANITE GROUP | 90        |      |
| SOAPSTONE AND TALC                   | 91        |      |
| STRONTIUM                            | 92        |      |
| SULPHUR                              | 92        |      |

## CHAPTER VI

|                  |     |  |
|------------------|-----|--|
| SALINES—         |     |  |
| INTRODUCTORY     | 94  |  |
| BORATES          | 94  |  |
| BROMINE          | 96  |  |
| CALCIUM CHLORIDE | 96  |  |
| IODINE           | 97  |  |
| MAGNESIUM SALTS  | 97  |  |
| NITRATES         | 98  |  |
| POTASH           | 98  |  |
| SALT             | 99  |  |
| SODA             | 99  |  |
|                  | 100 |  |

## CHAPTER VII

|   |     |  |
|---|-----|--|
| MINERAL PRODUCTION OF CALIFORNIA BY COUNTIES— |     |  |
| INTRODUCTORY                                  | 102 |  |
| ALAMEDA                                       | 103 |  |
| ALPINE  | 104 |  |
| AMADOR  | 104 |  |
| BUTTE   | 105 |  |
| CALAVERAS                                     | 105 |  |
| COLUSA  | 106 |  |
| CONTRA COSTA                                  | 106 |  |
| DEL NORTE                                     | 106 |  |
| EL DORADO                                     | 107 |  |
| FRESNO  | 107 |  |
| GLENN   | 108 |  |
| HUMBOLDT                                      | 108 |  |
| IMPERIAL                                      | 108 |  |
| INYO  | 109 |  |
| KERN  | 109 |  |
| KINGS   | 110 |  |
| LAKE  | 110 |  |
| LASSEN  | 111 |  |
| LOS ANGELES                                   | 111 |  |
| MADERA  | 112 |  |
| MARIN   | 112 |  |
| MARIPOSA                                      | 112 |  |
| MENDOCINO                                     | 113 |  |
| MERCED  | 113 |  |
| MODOC   | 114 |  |
| MONO  | 114 |  |
| MONTEREY                                      | 114 |  |
| NAPA  | 115 |  |
| NEVADA  | 115 |  |
| ORANGE  | 116 |  |
| PLACER  | 116 |  |
| PLUMAS  | 117 |  |
| RIVERSIDE                                     | 117 |  |
| SACRAMENTO                                    | 118 |  |
| SAN BENITO                                    | 118 |  |
| SAN BERNARDINO                                | 119 |  |
| SAN DIEGO                                     | 119 |  |
| SAN FRANCISCO                                 | 120 |  |

## CONTENTS

5

|  | Page |
|--|------|
| MINERAL PRODUCTION OF CALIFORNIA BY COUNTIES—Continued |      |
| SAN JOAQUIN  | 120  |
| SAN LUIS OBISPO  | 121  |
| SAN MATEO  | 121  |
| SANTA BARBARA  | 121  |
| SANTA CLARA  | 122  |
| SANTA CRUZ   | 122  |
| SHASTA   | 123  |
| SIERRA   | 123  |
| SISKIYOU   | 124  |
| SOLANO   | 124  |
| SONOMA   | 125  |
| STANISLAUS   | 125  |
| SUTTER   | 125  |
| TEHAMA   | 126  |
| TRINITY  | 126  |
| TULARE   | 126  |
| TUOLUMNE   | 127  |
| VENTURA  | 127  |
| YOLO   | 128  |
| YUBA   | 128  |

## CHAPTER VIII

## DIRECTORY OF PRODUCERS OF METALLIC AND NONMETALLIC MINERALS IN CALIFORNIA, 1937—

|  |     |
|--|-----|
| INTRODUCTORY                           | 129 |
| BARITES                                | 130 |
| BENTONITE (Fuller's Earth)             | 130 |
| BITUMINOUS ROCK                        | 130 |
| BORATES                                | 131 |
| BROMINE                                | 131 |
| CALCIUM CHLORIDE                       | 131 |
| CARBON DIOXIDE GAS                     | 132 |
| CEMENT                                 | 132 |
| CHROMITE                               | 133 |
| CLAY                                   | 134 |
| COAL                                   | 138 |
| COPPER                                 | 138 |
| DIATOMITE                              | 139 |
| DOLOMITE                               | 139 |
| FELDSPAR                               | 140 |
| FLUORSPAR                              | 140 |
| GEMS                                   | 140 |
| GOLD                                   | 141 |
| GRANITE                                | 148 |
| GYPSUM                                 | 149 |
| IODINE                                 | 149 |
| IRON                                   | 149 |
| LEAD                                   | 150 |
| LIME AND LIMESTONE                     | 151 |
| MAGNESITE                              | 152 |
| MAGNESIUM SALTS                        | 152 |
| MARBLE (including Onyx and Travertine) | 153 |
| MICA                                   | 153 |
| MINERAL PAINT                          | 153 |
| MINERAL WATER                          | 154 |
| PLATINUM                               | 156 |
| POTASH                                 | 156 |
| PUMICE AND VOLCANIC ASH                | 157 |
| PYRITE                                 | 157 |
| QUICKSILVER                            | 158 |
| SALT                                   | 160 |
| SANDSTONE                              | 161 |
| SILICA (Sand and Quartz)               | 161 |
| SILLIMANITE-ANDALUSITE-KYANITE GROUP   | 161 |
| SILVER                                 | 162 |
| SLATE                                  | 164 |
| SOAPSTONE AND TALC                     | 165 |
| SODA                                   | 165 |
| STONE, MISCELLANEOUS                   | 166 |
| SULPHUR                                | 173 |
| TUNGSTEN                               | 173 |
| ZINC                                   | 174 |
| ZIRCON                                 | 174 |

## APPENDIX

|  | Page |
|--|------|
| MINING BUREAU ACT-----                           | 175  |
| DEPARTMENT OF NATURAL RESOURCES ACT-----         | 178  |
| PUBLICATIONS OF THE STATE DIVISION OF MINES----- | 180  |
| INDEX -----                                      | 196  |

### CHARTS, ILLUSTRATIONS, PHOTOS AND MAPS

|  |    |
|--|----|
| Gold Nuggets value \$7,000 from an ancient channel gravel mine, Sierra County,<br>mined in 1938 and displayed at State Fair----- | 34 |
| Dredge of Junction City Mining Co., Junction City, Trinity County-----   | 35 |
| Cloverdale Quicksilver Mine, Sonoma County, new concentrating plant above<br>old furnace plant below-----                        | 44 |
| Healdsburg gravel plant of Basalt Rock Co., on Russian River, Healdsburg,<br>Sonoma County -----                                 | 65 |
| Porcelain Fountain in State Fair Grounds, made of California Clays-----  | 74 |
| Steam Wells at The Geysers Hot Springs, Sonoma County-----   | 86 |

## **LETTER OF TRANSMITTAL**

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September, 1938

*To His Excellency, THE HONORABLE FRANK F. MERRIAM,  
Governor of the State of California.*

SIR: I have the honor to herewith transmit Bulletin No. 116 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

GEORGE D. NORDENHOLT,  
Director, Department of Natural Resources.



## INTRODUCTION

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It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,  
State Mineralogist.



# MINERAL INDUSTRY, CALIFORNIA, 1937

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## DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

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### CHAPTER ONE

The total value for the mineral output for California for the year 1937 was \$361,515,951, being an increase of \$33,711,683 over the total of 1936 which was \$327,804,268. There were fifty-seven different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all fifty-eight counties of the state contributed to the list.

As revealed by the data following, the salient features of 1937 compared with the previous year were: All groups such as fuels, metals, industrial minerals, and salines, with the exception of the structural materials, showed an increase in total value. Of the individual mineral products, petroleum showed the greatest increase in value and output, followed in turn by gold, natural gas, brick and hollow building-tile, silver, tungsten ore, potash, mineral water, copper, miscellaneous stone, borates, quicksilver, limestone, diatomite, and others; while those showing a decrease in amount and value were cement, granite, magnesium salts, platinum, bituminous rock, pyrite, pumice and volcanic ash, salt, and slate.

Of the fuels, petroleum showed an increase in value of \$26,178,687, and an increase in amount of from 214,776,227 barrels to 238,558,562 barrels of crude oil. The average price received for all grades of crude oil was an increase over that received in 1936 although there was no change in the price of crude from June, 1936. Natural gas showed an increase in value and amount from 298,922,708 M cu. ft. worth \$18,585,970 to 323,883,714 M cu. ft., worth \$19,859,865.

Of the metals, the gold output increased from 1,077,442 fine ounces to 1,174,578 fine ounces; and in value from \$37,710,470 to \$41,110,230. Silver increased from 2,103,799 fine ounces worth \$1,629,392 to 2,888,265 fine ounces worth \$2,234,073; copper from 9,991,799 lbs. worth \$919,245, to 10,512,500 lbs. worth \$1,272,013, with all other metals showing an increase in output except iron ore and the platinum metals, which showed a slight decrease.

Of the structural materials, miscellaneous stone increased in value from \$16,578,238 to \$16,917,683 with also lime, marble, magnesite, and sandstone showing increased total values. Cement declined in amount and value from 13,300,188 barrels valued at \$18,314,589, to 12,072,062 barrels worth \$16,546,229, with all other substances in the group showing lower total values than the previous year.

In the industrial group, the total value increased from \$5,236,534 to \$6,159,918, and with most of the important mineral products therein showing increases, noteworthy were diatomite, limestone, mineral water, pottery clay, gypsum, silica, talc and soapstone. Slight decreases were registered by feldspar, pumice and volcanic ash, and pyrite.

The total value of the saline group increased from \$12,416,349 to \$13,216,270, with all the larger products showing an increased value with the exception of salt and magnesium salts.

#### By Substances.

The following table shows the comparative yield of mineral substances of California for 1936 and 1937, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

| Substance                             | 1936                  |                 | 1937                  |               | Increase+<br>Decrease-<br>Value |
|---------------------------------------|-----------------------|-----------------|-----------------------|---------------|---------------------------------|
|                                       | Amount                | Value           | Amount                | Value         |                                 |
| Bentonite (fuller's earth)...         | 10,185 tons           | \$165,131       | 8,425 tons            | \$140,261     | \$24,870                        |
| Borates...                            | 313,389 tons          | 5,911,093       | 326,099 tons          | 6,206,619     | 295,526+                        |
| Brick & hollow building tile...       |                       | 2,240,905       |                       | 3,083,902     | 842,997+                        |
| Cement...                             | 13,300,188 bbls.      | 18,314,589      | 12,072,062 bbls.      | 16,546,229    | 1,768,360-                      |
| Chromite...                           | 221 tons              | 3,314           | 1,918 tons            | 20,830        | 17,516+                         |
| Clay (pottery)...                     | 382,823 tons          | 646,920         | 354,669 tons          | 705,200       | 58,280+                         |
| Coal...                               | 370 tons              | 1,815           | *                     | *             | *                               |
| Copper...                             | 9,991,799 lbs.        | 919,245         | 10,512,500 lbs.       | 1,272,013     | 352,768+                        |
| Dolomite...                           | *                     | *               | 12,371 tons           | 24,603        | -                               |
| Feldspar...                           | 3,430 tons            | 24,959          | 2,686 tons            | 10,930        | 14,029-                         |
| Gems...                               |                       | 2,878           |                       | 2,075         | 803                             |
| Gold...                               | 1,077,442 fine ozs.   | 37,710,470      | 1,174,578 fine ozs.   | 41,110,230    | 3,399,760+                      |
| Granite...                            |                       | 244,243         |                       | 207,738       | 36,505                          |
| Gypsum...                             | 143,549 tons          | 282,703         | 186,160 tons          | 384,431       | 101,728+                        |
| Iron ore...                           | *                     | *               | 5,490 tons            | 29,340        | *                               |
| Lead...                               | 1,098,545 lbs.        | 50,533          | 2,402,110 lbs.        | 141,724       | 91,191+                         |
| Lime...                               | 64,275 tons           | 633,678         | 69,532 tons           | 681,277       | 47,599+                         |
| Limestone...                          | 295,792 tons          | 661,757         | 351,755 tons          | 830,562       | 168,805+                        |
| Magnesium salts...                    | 3,798 tons            | 347,838         | 7,733,918 lbs.        | 316,669       | 31,169-                         |
| Marble <sup>a</sup> ...               |                       | 23,011          |                       | 23,667        | 656+                            |
| Mineral water...                      | 19,348,513 gals.      | 777,899         | 18,309,729 gals.      | 1,130,810     | 352,911+                        |
| Natural gas...                        | 295,922,708 M. cu.ft. | 18,585,970      | 323,883,714 M. cu.ft. | 19,859,865    | 1,273,895+                      |
| Petroleum...                          | 214,776,227 bbls.     | 211,167,185     | 238,558,562 bbls.     | 237,845,872   | 26,178,687-                     |
| Platinum group...                     |                       | 1,000 fine ozs. | 40,669                | 530 fine ozs. | 23,704                          |
| Pumice and volcanic ash...            | 17,132 tons           | 143,709         | 10,392 tons           | 79,005        | 64,704-                         |
| Quicksilver...                        | 8,758 flasks          | 671,055         | 9,995 flasks          | 837,789       | 166,734+                        |
| Salt...                               | 398,249 tons          | 1,227,505       | 370,431 tons          | 1,044,325     | 183,180-                        |
| Sandstone...                          |                       | 9,180           |                       | 15,680        | 6,500+                          |
| Silica (sand and quartz)...           | 77,830 tons           | 310,273         | 84,313 tons           | 348,987       | 38,709+                         |
| Silver...                             | 2,103,799 fine ozs.   | 1,629,392       | 2,888,265 fine ozs.   | 2,234,073     | 604,681+                        |
| Slate...                              |                       | 49,818          |                       | 32,572        | 17,246-                         |
| Soapstone and talc...                 | 25,643 tons           | 309,287         | 29,657 tons           | 347,772       | 38,485+                         |
| Soda...                               | 144,314 tons          | 1,412,788       | 153,685 tons          | 1,461,057     | 48,269+                         |
| Stone, miscellaneous <sup>b</sup> ... |                       | 16,578,238      |                       |               |                                 |
| Tungsten ore...                       | 236 tons              | 210,819         | 611 tons              | 782,187       | 571,368+                        |
| Zinc...                               | 29,740 lbs.           | 1,487           | 39,643 lbs.           | 2,577         | 1,090+                          |
| Unapportioned...                      |                       | 5,993,907       |                       | 46,813,693    | 819,786+                        |
| Totals...                             |                       | \$327,804,268   |                       | \$361,515,951 |                                 |
| Net increase...                       |                       |                 |                       |               | \$33,711,683+                   |

\* Included under 'Unapportioned.'

<sup>a</sup> Includes onyx and travertine.

<sup>b</sup> Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

<sup>c</sup> Includes barite, bituminous rock, bromine, calcium chloride, carbon dioxide, dolomite, iodine, iron ore, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-cyanite group, tube-mill pebbles, and sulphur.

<sup>d</sup> Includes barite, bituminous rock, bromine, carbon dioxide, calcium chloride, coal, diatomite, fluor spar, iodine, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-cyanite group, sulphur, zircon, tube-mill pebbles.

## By Counties.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1936 and 1937:

| County          | 1936          | 1937          |
|-----------------|---------------|---------------|
| Alameda         | \$2,413,115   | \$2,476,302   |
| Alpine          | 9,541         | 22,791        |
| Amador          | 3,617,449     | 3,917,866     |
| Butte           | 1,393,874     | 1,798,992     |
| Calaveras       | 3,513,180     | 3,279,250     |
| Colusa          | 15,483        | 9,424         |
| Contra Costa    | 1,706,131     | 1,867,309     |
| Del Norte       | 16,776        | 30,647        |
| El Dorado       | 2,796,980     | 2,607,972     |
| Fresno          | 40,245,111    | 41,178,791    |
| Glenn           | 134,466       | 136,368       |
| Humboldt        | 78,098        | 100,715       |
| Imperial        | 256,941       | 677,401       |
| Inyo            | 1,470,847     | 1,439,009     |
| Kern            | 65,344,764    | 74,162,134    |
| Kings           | 9,949,931     | 11,008,597    |
| Lake            | 341,066       | 392,555       |
| Lassen          | 66,283        | 86,240        |
| Los Angeles     | 86,227,432    | 100,337,635   |
| Madera          | 222,592       | 133,165       |
| Marin           | 222,974       | 300,204       |
| Mariposa        | 1,130,018     | 1,270,774     |
| Mendocino       | 35,596        | 114,705       |
| Merced          | 2,009,328     | 2,535,126     |
| Modoc           | 32,306        | 36,990        |
| Mono            | 498,851       | 804,925       |
| Monterey        | 187,750       | 262,651       |
| Napa            | 567,153       | 356,146       |
| Nevada          | 10,322,695    | 11,355,056    |
| Orange          | 22,132,919    | 22,659,380    |
| Placer          | 1,554,865     | 1,754,040     |
| Plumas          | 1,923,777     | 2,354,957     |
| Riverside       | 4,449,170     | 4,057,127     |
| Sacramento      | 4,254,685     | 4,230,689     |
| San Benito      | 348,812       | 504,510       |
| San Bernardino  | 15,396,166    | 16,012,330    |
| San Diego       | 582,556       | 591,479       |
| San Francisco   | 23,870        | 41,825        |
| San Joaquin     | 461,064       | 706,620       |
| San Luis Obispo | 352,346       | 323,691       |
| San Mateo       | 2,410,807     | 2,310,784     |
| Santa Barbara   | 9,693,339     | 10,709,056    |
| Santa Clara     | 675,188       | 722,903       |
| Santa Cruz      | 2,103,122     | 2,074,463     |
| Shasta          | 1,699,902     | 2,199,423     |
| Sierra          | 787,634       | 974,680       |
| Siskiyou        | 831,103       | 1,200,351     |
| Solano          | 16,552        | 145,567       |
| Sonoma          | 185,417       | 273,063       |
| Stanislaus      | 691,614       | 940,030       |
| Sutter          | 17,368        | 22,959        |
| Tehama          | 100,403       | 65,193        |
| Trinity         | 724,109       | 721,290       |
| Tulare          | 209,968       | 314,952       |
| Tuolumne        | 723,469       | 1,012,180     |
| Ventura         | 17,631,880    | 19,230,720    |
| Yolo            | 71,609        | 44,171        |
| Yuba            | 2,893,823     | 2,587,748     |
| Total value     | \$327,804,268 | \$361,515,951 |

## Total Mineral Production of California, by Years, Since 1887.

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later Plumas County. Cement increased rapidly from 1902, while crushed

rock, sand and gravel as a group paralleled the cement increase. Quicksilver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915-1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these have since declined, though silver, structural materials and copper increased in 1920-1924, also lead and magnesite in 1923; lead and zinc in 1925; zinc in 1926, with silver declining; an increase in quicksilver in 1927-1928, with declines in other metals and by petroleum. Natural gas showed a steady increase from 1907, and in 1928-1933 its value was second only to petroleum.

In 1929 the annual output of gold was the smallest since its discovery. From 1929 to 1936 there was a rapid increase in gold production, due in part to the raise in its price per ounce.

**Total Mineral Production of California, by Years, Since 1887**

| Year   | Total value of all minerals | Gold, value   | Petroleum, value |
|--------|-----------------------------|---------------|------------------|
| 1887   | \$19,785,868                | \$13,588,614  | \$1,357,144      |
| 1888   | 19,469,320                  | 12,750,000    | 1,380,666        |
| 1889   | 16,681,731                  | 11,212,913    | 368,048          |
| 1890   | 18,039,666                  | 12,309,793    | 384,200          |
| 1891   | 18,872,413                  | 12,728,869    | 401,264          |
| 1892   | 18,300,168                  | 12,571,900    | 561,333          |
| 1893   | 18,811,261                  | 12,422,811    | 608,092          |
| 1894   | 20,203,294                  | 13,923,281    | 1,064,521        |
| 1895   | 22,844,663                  | 15,334,317    | 1,000,235        |
| 1896   | 24,291,398                  | 17,181,562    | 1,180,793        |
| 1897   | 25,142,441                  | 15,871,401    | 1,918,269        |
| 1898   | 27,289,079                  | 15,906,478    | 2,376,420        |
| 1899   | 29,313,460                  | 15,336,031    | 2,660,793        |
| 1900   | 32,622,945                  | 15,383,355    | 4,152,928        |
| 1901   | 34,355,981                  | 16,989,044    | 2,961,102        |
| 1902   | 35,069,105                  | 16,910,320    | 4,692,189        |
| 1903   | 37,759,040                  | 16,471,264    | 7,313,271        |
| 1904   | 43,778,348                  | 19,109,600    | 8,317,809        |
| 1905   | 43,069,227                  | 19,197,043    | 9,077,820        |
| 1906   | 46,776,085                  | 18,732,452    | 9,238,020        |
| 1907   | 55,697,949                  | 16,727,928    | 16,783,943       |
| 1908   | 66,363,198                  | 18,761,559    | 26,566,181       |
| 1909   | 82,972,209                  | 20,237,870    | 32,398,187       |
| 1910   | 88,419,079                  | 19,715,440    | 37,689,512       |
| 1911   | 87,497,879                  | 19,738,908    | 40,552,088       |
| 1912   | 88,972,385                  | 19,713,478    | 41,868,344       |
| 1913   | 98,644,639                  | 20,406,958    | 48,578,014       |
| 1914   | 93,314,773                  | 20,653,496    | 47,457,109       |
| 1915   | 96,663,369                  | 22,442,296    | 43,503,837       |
| 1916   | 127,991,610                 | 21,410,741    | 57,421,334       |
| 1917   | 161,292,962                 | 20,087,504    | 86,976,209       |
| 1918   | 199,753,837                 | 16,529,162    | 127,459,221      |
| 1919   | 195,830,002                 | 16,695,955    | 142,610,563      |
| 1920   | 242,099,667                 | 14,311,043    | 178,394,937      |
| 1921   | 268,157,472                 | 15,704,822    | 203,138,225      |
| 1922   | 245,183,826                 | 14,670,346    | 173,381,265      |
| 1923   | 344,024,678                 | 13,379,013    | 242,731,309      |
| 1924   | 374,620,789                 | 13,150,175    | 274,652,874      |
| 1925   | 434,519,660                 | 13,065,330    | 330,609,829      |
| 1926   | 450,330,856                 | 11,923,481    | 345,546,677      |
| 1927   | 366,781,394                 | 11,671,018    | 260,735,498      |
| 1928   | 332,224,233                 | 10,785,315    | 229,998,680      |
| 1929   | 432,248,228                 | 8,526,703     | 321,366,863      |
| 1930   | 365,604,695                 | 9,451,162     | 271,699,046      |
| 1931   | 215,964,420                 | 10,814,162    | 141,835,723      |
| 1932   | 199,196,493                 | 11,765,726    | 142,899,247      |
| 1933   | 206,489,058                 | 15,683,075    | 143,063,972      |
| 1934   | 237,374,709                 | 25,131,284    | 159,529,671      |
| 1935   | 263,404,317                 | 31,165,050    | 179,335,311      |
| 1936   | 327,804,268                 | 37,710,470    | 211,667,185      |
| 1937   | 361,515,951                 | 41,110,230    | 237,845,872      |
| Totals | \$7,663,854,098             | \$867,549,748 | \$4,859,262,673  |

## CHAPTER TWO

## FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which make up practically 70 per cent of the State's entire mineral output for the year 1937.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stock-food preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1936 and 1937 is shown in the following table:

| Substance         | 1936                 |               | 1937                 |               | Increase+<br>Decrease-<br>Value |
|-------------------|----------------------|---------------|----------------------|---------------|---------------------------------|
|                   | Amount               | Value         | Amount               | Value         |                                 |
| Coal-----         | 370 tons             | \$1,815       | 369 tons             | \$2,933       | \$1,118+                        |
| Natural gas-----  | 239,922,708 M cu.ft. | 18,585,970    | 323,883,714 M cu.ft. | 19,859,865    | 1,273,895+                      |
| Petroleum-----    | 214,776,277 bbls.    | 211,667,185   | 238,558,562 bbls.    | 237,845,872   | 26,178,687+                     |
| Total value-----  |                      | \$230,254,970 |                      | \$257,708,670 |                                 |
| Net increase----- |                      |               |                      |               | \$27,453,700+                   |

## COAL

*Bibliography:* State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, Pe. III.

The coal production in California during 1937 totaled 369 short tons valued at \$2,933, as compared with the 1936 output which was 370 short tons worth \$1,815. The material mined 1937 came from a single property each, in Amador, San Benito, and Trinity counties. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

## Total Coal Production of California.

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

## Coal Output and Value, by Years

| Year | Tons    | Value     | Year   | Tons      | Value        |
|------|---------|-----------|--------|-----------|--------------|
| 1861 | 6,620   | \$38,065  | 1900   | 176,956   | \$535,531    |
| 1862 | 23,400  | 134,550   | 1901   | 150,724   | 401,772      |
| 1863 | 43,200  | 248,400   | 1902   | 88,460    | 248,622      |
| 1864 | 50,700  | 291,525   | 1903   | 93,026    | 265,383      |
| 1865 | 60,530  | 348,048   | 1904   | 79,062    | 376,494      |
| 1866 | 84,020  | 483,115   | 1905   | 46,500    | 144,500      |
| 1867 | 124,690 | 716,968   | 1906   | 24,850    | 61,600       |
| 1868 | 143,676 | 826,137   | 1907   | 23,734    | 55,849       |
| 1869 | 157,234 | 904,096   | 1908   | 18,496    | 55,503       |
| 1870 | 141,890 | 815,868   | 1909   | 49,389    | 216,913      |
| 1871 | 152,493 | 876,835   | 1910   | 11,033    | 23,454       |
| 1872 | 190,859 | 1,097,439 | 1911   | 11,047    | 18,297       |
| 1873 | 186,611 | 1,073,013 | 1912   | 14,484    | 39,092       |
| 1874 | 215,352 | 1,238,274 | 1913   | 25,198    | 85,809       |
| 1875 | 166,638 | 958,169   | 1914   | 11,859    | 28,806       |
| 1876 | 128,049 | 736,282   | 1915   | 10,299    | 26,662       |
| 1877 | 107,789 | 619,787   | 1916   | 4,037     | 7,030        |
| 1878 | 134,237 | 771,863   | 1917   | 3,527     | 7,691        |
| 1879 | 147,879 | 850,304   | 1918   | 6,343     | 16,149       |
| 1880 | 236,950 | 1,362,463 | 1919   | 2,983     | 8,203        |
| 1881 | 140,000 | 805,000   | 1920   | 2,078     | 5,450        |
| 1882 | 112,592 | 647,404   | 1921   | 12,467    | 63,578       |
| 1883 | 76,162  | 380,810   | 1922   | 27,020    | 135,100      |
| 1884 | 77,485  | 309,950   | 1923   | 1,010     | 5,090        |
| 1885 | 71,615  | 286,460   | 1924   | 1,425     | 8,800        |
| 1886 | 100,000 | 300,000   | 1925   | 730       | 3,880        |
| 1887 | 50,000  | 150,000   | 1926   | 1,100     | 5,000        |
| 1888 | 95,000  | 380,000   | 1927   | 200       | 1,100        |
| 1889 | 121,280 | 288,232   | 1928   | 782       | 4,542        |
| 1890 | 110,711 | 283,019   | 1929   | 450       | 2,476        |
| 1891 | 93,301  | 204,902   | 1930   | 10,885    | 59,858       |
| 1892 | 85,178  | 209,711   | 1931   | 12,551    | 77,607       |
| 1893 | 72,603  | 167,555   | 1932   | 9,508     | 36,468       |
| 1894 | 59,887  | 139,862   | 1933   | 2,612     | 11,367       |
| 1895 | 79,858  | 193,790   | 1934   | 13,549    | 52,720       |
| 1896 | 70,649  | 161,335   | 1935   | 8,049     | 32,745       |
| 1897 | 87,449  | 196,255   | 1936   | 370       | 1,815        |
| 1898 | 143,045 | 337,475   | 1937   | 269       | 2,933        |
| 1899 | 160,941 | 420,109   | Totals | 5,267,635 | \$23,386,989 |

The tonnages in the above table for the years 1861-1886 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93-94), being an average of \$5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

## NATURAL GAS

*Bibliography:* State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX. Bulletins 3, 16, 19, 69, 73, 89. Monthly Summary Oil and Gas Supervisor, Dec., 1919; Aug., 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not overestimated, particularly in the seven oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of

small amounts of gas and transporting it for any considerable distance may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

**Actual Production of Natural Gas—How Disposed of in California—1937**

| County         | Production<br>M cubic feet | Utilized<br>M cubic feet | Wasted<br>M cubic feet | Stored<br>M cubic feet |
|----------------|----------------------------|--------------------------|------------------------|------------------------|
| Fresno         | 70,374,043                 | 2,158,305                | 941,319                | 67,274,419             |
| Kern           | 70,926,701                 | 3,371,762                | 2,412,085              | 65,142,854             |
| Kings          | 48,253,387                 | 1,621,563                | 707,225                | 45,924,599             |
| Los Angeles    | 71,079,837                 | 5,385,823                | 234,434                | 65,459,580             |
| Orange         | 24,300,505                 | 636,597                  | 128,212                | 23,535,696             |
| San Joaquin    | 5,774,712                  | 34,486                   |                        | 5,740,226              |
| Santa Barbara  | 7,667,778                  | 983,900                  | 1,126,257              | 5,557,621              |
| Ventura        | 46,146,504                 | 1,594,914                | 448,751                | 44,102,839             |
| Other counties | 1,325,003                  | 179,123                  |                        | 1,145,880              |
| Totals         | 345,848,470                | 15,066,473               | 5,998,283              | 323,883,71             |

**Production and Value.**

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1937 gave from 1.5¢ to 85¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1937 works out at approximately 6.13¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

**Utilized Production of Natural Gas in California, 1937**

| County  | M cubic feet | Value        |
|---|--------------|--------------|
| Fresno  | 67,274,419   | \$4,308,280  |
| Kern  | 65,142,854   | 3,950,521    |
| Kings   | 45,924,599   | 2,944,800    |
| Los Angeles   | 65,459,580   | 4,655,204    |
| Orange  | 23,535,696   | 1,599,811    |
| San Joaquin   | 5,740,226    | 484,381      |
| Santa Barbara   | 5,557,621    | 328,572      |
| Ventura   | 44,102,839   | 1,457,709    |
| Butte, Humboldt, Lake, Mendocino, Monterey, Sacramento, Solano, Sutter, Tulare* | 1,145,880    | 130,587      |
| Totals  | 323,883,714  | \$19,859,865 |

\* Combined to conceal the output of individual operators in each.

The above totals showed an increase in amount and value compared with the figures of the previous year, which were 298,922,708 M. cu. ft. worth \$18,585,970. Los Angeles County led in the yield of natural gas during 1937, followed in turn by, Fresno and Kern counties. Increased value of output was shown by Fresno, Kern,

Kings, Orange, San Joaquin, and Santa Barbara counties; while a decrease was shown by Los Angeles and Ventura counties.

#### Natural Gas Production in California Since 1888.

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854-1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

Natural Gas Production in California Since 1888

| Year | M cubic feet | Value     | Year   | M cubic feet  | Value         |
|------|--------------|-----------|--------|---------------|---------------|
| 1888 | *12,000      | \$10,000  | 1914   | 16,529,963    | \$1,049,470   |
| 1889 | *14,500      | 12,680    | 1915   | 21,992,892    | 1,706,480     |
| 1890 | *41,250      | 33,000    | 1916   | 28,134,365    | 2,871,751     |
| 1891 | *39,000      | 30,000    | 1917   | 44,343,020    | 2,964,922     |
| 1892 | *75,000      | 55,000    | 1918   | 46,373,052    | 3,289,524     |
| 1893 | *84,000      | 68,500    | 1919   | 52,173,503    | 4,041,217     |
| 1894 | *ab55,000    | 75,000    | 1920   | 58,567,772    | 3,898,286     |
| 1895 | *ab110,000   | 100,000   | 1921   | 67,043,797    | 4,704,678     |
| 1896 | *ab131,000   | 110,157   | 1922   | 103,628,027   | 6,990,030     |
| 1897 | *71,300      | 62,657    | 1923   | 240,405,397   | 15,661,433    |
| 1898 | *111,165     | 74,424    | 1924   | 209,021,596   | 15,153,140    |
| 1899 | 115,110      | 95,000    | 1925   | 194,719,924   | 15,890,082    |
| 1900 | 40,566       | 34,578    | 1926   | 214,549,477   | 19,465,347    |
| 1901 | 120,800      | 92,034    | 1927   | 224,686,940   | 20,447,294    |
| 1902 | 120,968      | 99,443    | 1928   | 260,887,116   | 22,260,947    |
| 1903 | 120,134      | 75,237    | 1929   | 400,129,201   | 29,675,546    |
| 1904 | 144,437      | 91,035    | 1930   | 315,513,952   | 24,559,840    |
| 1905 | 148,345      | 102,479   | 1931   | 344,959,920   | 16,690,695    |
| 1906 | 168,175      | 109,489   | 1932   | 284,168,872   | 16,272,061    |
| 1907 | 169,991      | 114,759   | 1933   | 271,743,544   | 15,403,514    |
| 1908 | 842,883      | 474,584   | 1934   | 263,207,517   | 14,408,761    |
| 1909 | 1,148,467    | 616,932   | 1935   | 302,447,193   | 17,680,661    |
| 1910 | 10,579,933   | 1,676,367 | 1936   | 298,922,708   | 18,585,970    |
| 1911 | *5,000,000   | 491,850   | 1937   | 323,883,714   | 19,859,865    |
| 1912 | *12,600,000  | 940,076   | Totals | 4,635,238,322 | \$320,230,116 |
| 1913 | 14,210,836   | 1,053,292 |        |               |               |

<sup>a</sup> Quantity, in part, estimated, where values only were reported.

<sup>b</sup> Tabulations published previously to 1933 included values of CO<sub>2</sub>, now shown under "Industrial Materials."

#### Gasoline from Natural Gas.

More or less gas usually accompanies the petroleum in the old fields, and such gas carries varying amounts of gasoline. A total of 94 plants were in operation in 1937 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 649,774,253 gallons of casing-head gasoline valued at \$40,051,437 was reported made from all fields in California by 94 plants during 1937 compared with 603,053,878 gallons worth \$33,211,791 from 91 plants in 1936. The 1937 output was distributed as follows:

| County             | No. plants | Gallons            | Value               |
|--------------------|------------|--------------------|---------------------|
| Fresno.....        | 7          | 111,161,436        | \$6,671,186         |
| Kern.....          | 19         | 65,254,770         | 3,777,754           |
| Kings.....         | 7          | 83,475,760         | 5,000,415           |
| Los Angeles.....   | 34         | 236,254,489        | 15,088,335          |
| Orange.....        | 12         | 74,670,356         | 4,626,242           |
| Santa Barbara..... | 9          | 17,868,846         | 943,372             |
| Ventura.....       | 11         | 61,188,596         | 3,944,133           |
| <b>Totals.....</b> | <b>94</b>  | <b>649,774,253</b> | <b>\$40,051,437</b> |

The usual recoveries of gasoline from natural gas vary from  $\frac{1}{2}$  gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen<sup>1</sup> gives the average recovery for 1937 as 1.659 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

|                     | M cubic feet<br>natural<br>gas treated | Gallons of<br>gasoline<br>recovered | Recovery<br>gallons<br>per M cu. ft. |
|---------------------|--|-------------------------------------|--------------------------------------|
| Oil absorption..... | 323,759,216                            | 20,101,986                          | 1.659                                |

### PETROLEUM

*Bibliography:* State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI, XXXIII. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1937 amounted to a total of 238,558,562 barrels having a value of \$237,845,872 at the well. This was an increase in both amount and value as compared with the 1936 output which was 214,776,227 barrels worth \$211,667,185.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929-1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in

<sup>1</sup> Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1937), U. S. Bureau of Mines.

each field<sup>1</sup> and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The value given to the 1934-1937 petroleum output by this department was obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

TABLE A  
Production and Value of Crude Oil by Counties

| County  | 1936        |               | 1937        |               |
|---|-------------|---------------|-------------|---------------|
|   | Barrels     | Value         | Barrels     | Value         |
| Fresno.....   | 30,035,864  | \$36,317,189  | 29,091,322  | \$36,521,804  |
| Kern.....   | 62,273,932  | 53,781,287    | 69,878,714  | 61,905,918    |
| Kings.....  | 5,317,882   | 7,115,273     | 5,800,589   | 8,062,833     |
| Los Angeles.....                                      | 72,629,599  | 70,758,648    | 86,659,477  | 83,922,309    |
| Orange.....   | 21,685,351  | 20,321,674    | 22,060,820  | 20,854,524    |
| Santa Barbara.....                                    | 7,149,077   | 8,174,953     | 8,273,815   | 8,961,642     |
| Ventura.....  | 15,569,523  | 15,118,061    | 16,720,713  | 17,562,688    |
| San Bernardino, San Luis Obispo, Santa Clara, Tulare* | 114,899     | 80,100        | 73,112      | 54,154        |
| Totals.....   | 214,776,227 | \$211,667,185 | 238,558,562 | \$237,845,872 |

\* Combined to conceal the output of operators in each.

The foregoing totals show an average price of \$0.997 per barrel for the year 1937, as compared with \$0.986 in the year 1936, \$0.870 in 1935, \$0.913 in 1934, \$0.831 in 1933, and \$0.807 in 1932.

TABLE B  
Average Price of Oil per Barrel, by Counties, 1928-1937

| County               | 1928    | 1929    | 1930    | 1931    | 1932    | 1933    | 1934    | 1935    | 1936    | 1937    |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Fresno.....          | \$0.764 | \$0.519 | \$0.568 | \$0.551 | \$0.556 | \$0.573 | \$0.650 | \$0.941 | \$1.209 | \$1.255 |
| Kern.....            | .835    | .741    | .838    | .636    | .658    | .665    | .729    | .729    | .863    | .886    |
| Kings.....           | 1.674   | 1.515   | .723    | .837    | .934    | 1.085   | 1.045   | 1.338   | 1.390   |         |
| Los Angeles.....     | 1.051   | 1.189   | 1.297   | .784    | .860    | .892    | .990    | .914    | .974    | .968    |
| Orange.....          | .935    | .986    | 1.060   | .753    | .762    | .827    | .937    | .898    | .937    | .945    |
| San Luis Obispo..... |         |         |         |         | .550    |         |         |         |         |         |
| Santa Barbara.....   | 1.108   | 1.255   | 1.404   | .954    | .962    | .848    | .951    | .924    | 1.143   | 1.083   |
| Santa Clara.....     |         |         |         |         | .550    |         |         |         |         |         |
| Ventura.....         | 1.098   | 1.150   | 1.396   | .771    | .849    | .838    | .944    | .901    | .971    | 1.050   |
| State averages....   | \$0.992 | \$1.094 | \$1.195 | \$0.753 | \$0.807 | \$0.831 | \$0.913 | \$0.970 | \$0.986 | \$0.997 |

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

#### TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San

<sup>1</sup> By courtesy of Standard Oil Company of California.

Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,<sup>1</sup> in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877."<sup>2</sup>

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new

<sup>1</sup> Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.

<sup>2</sup> *Idem*, p. 301.

fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

TABLE C  
Total Petroleum Production in California

| Year                       | Barrels    | Value      | Year        | Barrels       | Value           |
|----------------------------|------------|------------|-------------|---------------|-----------------|
| To and including 1875----- | 175,000    | b\$472,500 | 1907-----   | 40,311,171    | \$1,678,943     |
| 1876-----                  | 12,000     | 30,000     | 1908-----   | 48,306,910    | 26,566,181      |
| 1877-----                  | 13,000     | 29,250     | 1909-----   | 58,191,723    | 32,398,187      |
| 1878-----                  | 15,227     | 30,454     | 1910-----   | 77,697,568    | 37,689,542      |
| 1879-----                  | 19,858     | 39,716     | 1911-----   | 84,648,157    | 40,552,088      |
| 1880-----                  | 40,552     | 60,828     | 1912-----   | 89,689,250    | 41,868,344      |
| 1881-----                  | 99,862     | 124,828    | 1913-----   | 98,494,532    | 48,578,014      |
| 1882-----                  | 128,636    | 257,272    | 1914-----   | 102,881,907   | 47,457,109      |
| 1883-----                  | 142,857    | 285,714    | 1915-----   | 91,146,620    | 43,503,837      |
| 1884-----                  | 202,000    | 655,000    | 1916-----   | 90,262,557    | 57,421,334      |
| 1885-----                  | 325,000    | 750,750    | 1917-----   | 95,396,309    | 86,976,209      |
| 1886-----                  | 377,145    | b\$70,205  | 1918-----   | 99,731,177    | 127,459,221     |
| 1887-----                  | 678,572    | 1,357,144  | 1919-----   | 101,182,962   | 142,610,563     |
| 1888-----                  | 690,333    | 1,380,666  | 1920-----   | 103,377,361   | 178,304,937     |
| 1889-----                  | 303,220    | 368,048    | 1921-----   | 112,599,880   | 203,138,225     |
| 1890-----                  | 307,360    | 384,200    | 1922-----   | 138,468,222   | 173,381,265     |
| 1891-----                  | 323,600    | 401,264    | 1923-----   | 202,875,690   | 242,731,309     |
| 1892-----                  | 385,049    | 561,333    | 1924-----   | 228,933,471   | 274,652,874     |
| 1893-----                  | 470,179    | 608,092    | 1925-----   | 232,492,147   | 330,609,829     |
| 1894-----                  | 783,078    | 1,064,521  | 1926-----   | 224,673,281   | 345,546,677     |
| 1895-----                  | 1,245,339  | 1,000,235  | 1927-----   | 231,195,774   | 260,735,498     |
| 1896-----                  | 1,287,780  | 1,180,793  | 1928-----   | 231,811,465   | 229,998,680     |
| 1897-----                  | 1,911,569  | 1,918,269  | 1929-----   | 292,534,221   | 321,366,863     |
| 1898-----                  | 2,249,088  | 2,376,420  | 1930-----   | 227,328,988   | 271,699,046     |
| 1899-----                  | 2,677,875  | 2,660,793  | 1931-----   | 188,310,605   | 141,835,723     |
| 1900-----                  | 4,319,950  | 4,152,928  | 1932-----   | 177,745,286   | 142,890,247     |
| 1901-----                  | 7,710,315  | 2,961,102  | 1933-----   | 172,139,362   | 143,063,972     |
| 1902-----                  | 14,356,910 | 4,692,189  | 1934-----   | 174,721,282   | 159,529,671     |
| 1903-----                  | 24,340,839 | 7,313,271  | 1935-----   | 205,979,855   | 179,335,311     |
| 1904-----                  | 29,736,003 | 8,317,809  | 1936-----   | 214,776,227   | 211,667,185     |
| 1905-----                  | 34,275,701 | 9,007,820  | 1937-----   | 238,558,562   | 237,845,872     |
| 1906-----                  | 32,624,000 | 9,238,020  | Totals----- | 4,898,720,399 | \$4,862,869,190 |

\* U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

<sup>b</sup> Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

## Well Data.

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D  
Wells Operated, by Fields, 1937

| Field                      | Wells producing Dec., 1936 | Wells producing Dec., 1937 | Wells completed during year | Daily initial output | Wells abandoned during year | Bbls. per well produced per day Dec., 1936 | Bbls. per well produced per day Dec., 1937 |
|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------|-----------------------------|--|--|
| GROUP No. 1—Belridge—North | 40                         | 50                         | 14                          | 45,040               | 1                           | 276.6                                      | 323.0                                      |
| Belridge—South             | 156                        | 127                        | 1                           | 130                  |                             | 12.8                                       | 12.2                                       |
| Canal                      |                            | 1                          |                             | 2,267                |                             |  | 467.0                                      |
| Coalinga                   | 821                        | 914                        | 2                           | 22                   | 31                          | 19.0                                       | 16.5                                       |
| Edison                     | 89                         | 89                         | 10                          | 1,035                | 13                          | 62.1                                       | 42.5                                       |
| Elk Hills                  | 151                        | 170                        | 6                           | 987                  | 13                          | 57.8                                       | 64.5                                       |
| Fruitvale                  | 128                        | 159                        | 38                          | 10,241               | 22                          | 62.0                                       | 54.6                                       |
| Greeley                    | 1                          | 10                         | 10                          | 22,245               | 4                           | 11.0                                       | 377.2                                      |
| Kern River                 | 1,300                      | 1,334                      | 71                          | 10,984               | 18                          | 10.9                                       | 11.5                                       |
| Kettleman, M. D.           | 3                          | 3                          |                             |                      | 1                           | 125.3                                      | 29.3                                       |
| Kettleman, N. D.           | 122                        | 179                        | 30                          | 39,542               | 2                           | 652.8                                      | 459.1                                      |
| Lost Hills                 | 271                        | 204                        | 21                          | 3,291                | 7                           | 13.6                                       | 18.0                                       |
| McKittrick                 | 126                        | 217                        | 9                           | 665                  | 5                           | 16.9                                       | 20.1                                       |
| Midway-Sunset              | 2,313                      | 2,525                      | 123                         | 32,585               | 64                          | 25.4                                       | 29.4                                       |
| Mountain View              | 172                        | 196                        | 40                          | 18,059               | 2                           | 153.4                                      | 79.2                                       |
| Mt. Poso                   | 235                        | 278                        | 53                          | 13,053               | 19                          | 78.4                                       | 75.3                                       |
| Rio Bravo                  |                            | 1                          | 1                           | 2,550                |                             |  | 2,559.0                                    |
| Round Mountain             | 113                        | 161                        | 53                          | 18,632               | 13                          | 95.6                                       | 106.6                                      |
| Ten Section                | 2                          | 8                          | 7                           | 19,824               | 5                           | 257.5                                      | 457.8                                      |
| Wheeler Ridge              | 26                         | 28                         |                             |                      |                             | 13.5                                       | 11.1                                       |
| GROUP No. 2—Capitan        | 25                         | 40                         | 7                           | 1,985                | 1                           | 62.4                                       | 75.4                                       |
| Elwood                     | 78                         | 83                         | 1                           | 320                  | 4                           | 156.9                                      | 92.1                                       |
| Rincon                     | 29                         | 36                         | 7                           | 5,019                | 1                           | 71.1                                       | 55.3                                       |
| San Miguelito              | 9                          | 15                         | 5                           | 3,071                | 1                           | 176.1                                      | 246.0                                      |
| Santa Barbara              | 56                         | 36                         |                             |                      | 13                          | 24.6                                       | 15.8                                       |
| Santa Maria                | 198                        | 285                        | 64                          | 56,564               | 13                          | 23.0                                       | 48.6                                       |
| Summerland                 | 19                         | 19                         |                             |                      |                             | 1.8  | 1.6  |
| Ventura Avenue             | 245                        | 254                        | 20                          | 12,415               | 1                           | 104.6                                      | 140.5                                      |
| Ventura-Newhall            | 567                        | 578                        | 20                          | 3,273                | 14                          | 8.2  | 8.6  |
| Watsonville                | 7                          | 7                          |                             |                      |                             | 8.6  | 8.6  |
| GROUP No. 3—Brea-Olinda    | 360                        | 347                        |                             |                      |                             | 22.5                                       | 17.7                                       |
| Coyote—East                | 77                         | 83                         | 9                           | 1,904                | 4                           | 32.3                                       | 49.7                                       |
| Coyote—West                | 48                         | 33                         | 2                           | 378                  | 4                           | 172.7                                      | 280.4                                      |
| Dominguez                  | 130                        | 164                        | 17                          | 9,845                | 2                           | 204.1                                      | 181.0                                      |
| El Segundo                 | 4                          | 49                         | 49                          | 52,059               | 7                           | 101.8                                      | 407.2                                      |
| Huntington Beach           | 521                        | 573                        | 29                          | 5,009                | 9                           | 69.5                                       | 61.8                                       |
| Inglewood                  | 201                        | 195                        | 4                           | 5,788                | 9                           | 61.8                                       | 83.3                                       |
| Lawndale                   | 6                          | 6                          |                             |                      | 1                           | 22.3                                       | 14.8                                       |
| Long Beach                 | 1,242                      | 1,242                      | 24                          | 5,038                | 49                          | 55.0                                       | 46.8                                       |
| Los Angeles-Salt Lake      | 122                        | 113                        |                             |                      | 14                          | 6.8  | 5.0  |
| Montebello                 | 196                        | 206                        | 7                           | 1,357                | 7                           | 44.7                                       | 35.1                                       |
| Newport                    |                            |                            |                             |                      | 5                           |  |  |
| Playa del Rey              | 212                        | 203                        | 5                           | 1,308                | 15                          | 50.9                                       | 37.5                                       |
| Potrero                    | 10                         | 11                         | 1                           | 176                  | 2                           | 30.7                                       | 78.7                                       |
| Richfield                  | 260                        | 282                        | 22                          | 2,823                | 1                           | 25.7                                       | 35.7                                       |
| Rosecrans                  | 77                         | 83                         | 6                           | 3,282                | 2                           | 28.5                                       | 67.4                                       |
| Santa Fe Springs           | 633                        | 659                        | 3                           | 596                  | 34                          | 71.0                                       | 62.2                                       |
| Seal Beach                 | 101                        | 109                        | 2                           | 165                  | 4                           | 93.7                                       | 85.1                                       |
| Torrance                   | 533                        | 531                        | 18                          | 2,235                | 10                          | 14.7                                       | 14.3                                       |
| Whittier                   | 158                        | 155                        |                             |                      | 1                           | 10.0                                       | 5.9  |
| Wilmington                 |                            | 348                        | 335                         | 22,004               | 1                           |  | 179.5                                      |
| GROUP No. 1—Gas Fields:    |                            |                            |                             |                      |                             |  |  |
| Buena Vista Lake           | 5                          | 5                          |                             |                      |                             |  |  |
| Buttonwillow               | 22                         | 16                         |                             |                      |                             |  |  |
| Chowchilla                 |                            |                            |                             |                      |                             |  |  |
| Delano                     |                            | 1                          |                             |                      |                             |  |  |
| Dudley Ridge               |                            |                            |                             |                      | 1                           |  |  |
| Goleta                     | 3                          | 1                          |                             |                      |                             |  |  |
| McDonald Island            |                            | 4                          | 2                           | Gas                  |                             |  |  |
| Rio Vista                  | 1                          | 11                         | 15                          | Gas                  |                             |  |  |
| Semi-Tropic                |                            | 20                         |                             |                      |                             |  |  |
| Tracy                      | 6                          | 6                          |                             |                      |                             |  |  |
| Miscellaneous drilling     |                            |                            |                             |                      | 118                         |  |  |
| Totals                     | 12,230                     | 13,463                     | 1,164                       | 617,766              | 587                         | 48.1                                       | 52.4                                       |

## Specific Gravity of Oils Produced.

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Stand-

ard Oil Company. Specific gravities in California range from 8° Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Mari-copa; Wheeler Ridge, Kern County.

TABLE E  
Production of Light and Heavy Oils, by Fields, for 1937

| Field                   | Under 20°<br>(barrels) | 20° and above<br>(barrels) | Total<br>(barrels) |
|-------------------------|------------------------|----------------------------|--------------------|
| San Joaquin Valley—     |                        |                            |                    |
| Belridge—North          | 939                    | 5,718,191                  | 5,719,130          |
| Belridge—South          | 219,477                | 416,666                    | 636,143            |
| Canal                   |                        | 31,364                     | 31,364             |
| Coalinga                | 2,057,972              | 3,699,915                  | 5,757,887          |
| Comanche Point          |                        | 1,450                      | 1,450              |
| Edison                  | 676,912                | 873,689                    | 1,550,601          |
| Fruitvale               | 1,435,857              | 1,744,930                  | 3,180,787          |
| Elk Hills               | 776,287                | 3,010,772                  | 3,787,059          |
| Greeley                 |                        | 527,099                    | 527,099            |
| Kern River              | 4,978,124              |                            | 4,978,124          |
| Kettleman Hills, M. D.  |                        | 49,754                     | 49,754             |
| Kettleman Hills, N. D.  |                        | 29,081,905                 | 29,081,905         |
| Lost Hills              | 772,766                | 629,462                    | 1,402,228          |
| McKittrick              | 1,286,909              | 4,270                      | 1,291,179          |
| Midway-Sunset           | 9,525,429              | 16,943,816                 | 26,469,245         |
| Mountain View           |                        | 8,554                      | 8,554              |
| Mount Poso              | 6,513,792              | 6,667,278                  | 6,675,832          |
| Poso Creek              | 719,079                |                            | 719,079            |
| Rio Bravo               |                        | 127,788                    | 127,788            |
| Round Mountain          | 4,593,173              | 265,523                    | 4,858,696          |
| Ten Section (Old River) |                        | 932,427                    | 932,427            |
| Wheeler Ridge           |                        | 118,620                    | 118,620            |
| Coastal—                |                        |                            |                    |
| Arroyo Grande           | 22,967                 | 14,846                     | 37,813             |
| Capitan                 |                        | 918,458                    | 918,458            |
| Elwood                  |                        | 3,205,137                  | 3,205,137          |
| Lompoc                  | 85,862                 | 48,443                     | 134,305            |
| Newhall                 | 7,048                  | 96,746                     | 103,794            |
| Rincon                  |                        | 1,059,565                  | 1,059,565          |
| San Miguelito           |                        | 1,146,506                  | 1,146,506          |
| Santa Barbara Mesa      | 246,298                | 1,510                      | 247,808            |
| Santa Maria             | 2,627,255              | 1,082,028                  | 3,709,283          |
| Summerland              | 11,900                 |                            | 11,900             |
| Ventura Avenue          |                        | 12,685,100                 | 12,685,100         |
| Ventura County          | 51,307                 | 1,680,590                  | 1,731,897          |
| Watsonville             | 22,040                 |                            | 22,040             |
| Southern California—    |                        |                            |                    |
| Coyote—East             | 38,005                 | 1,359,643                  | 1,397,648          |
| Coyote—West             |                        | 2,887,816                  | 2,887,816          |
| Del Rey                 | 108,653                | 3,059,466                  | 3,168,119          |
| Dominguez               |                        | 9,837,311                  | 9,837,311          |
| El Segundo              | 3,682                  | 3,628,414                  | 3,632,096          |
| Huntington Beach        | 529,963                | 12,735,163                 | 13,265,126         |
| Inglewood               | 539,943                | 4,989,340                  | 5,529,283          |
| Lawndale                |                        | 31,451                     | 31,451             |
| Long Beach              | 60,976                 | 21,785,283                 | 21,846,259         |
| Los Angeles             | 73,537                 |                            | 73,537             |
| Montebello              | 169,130                | 2,996,488                  | 3,165,618          |
| Olinda Brea             | 233,165                | 2,421,438                  | 2,654,603          |
| Potrero                 |                        | 112,987                    | 112,987            |
| Richfield               | 457,216                | 2,678,577                  | 3,165,793          |
| Rosecrans               |                        | 1,256,499                  | 1,256,499          |
| Salt Lake               | 166,360                |                            | 166,360            |
| Santa Fe Springs        | 12,921                 | 15,721,633                 | 15,734,554         |
| Seal Beach              |                        | 3,409,688                  | 3,409,688          |
| Torrance                | 1,909,019              | 934,478                    | 2,843,497          |
| Whittier                | 225,153                | 109,439                    | 334,592            |
| Wilmington              | 8,172,944              | 5,900,803                  | 14,073,747         |
| Miscellaneous           |                        | 3,340                      | 3,340              |
| Grand totals            | 49,370,614             | 188,643,105                | 238,013,719        |

## Oil in "Storage."

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast<sup>1</sup> territory totaled 128,040,247 barrels December 31, 1937, as compared with 131,343,736 barrels on December 31, 1936. The total decrease in stock over the preceding year was 3,303,489 barrels.

|  | Dec. 31, 1936<br>(barrels) | Dec. 31, 1937<br>(barrels) |
|--|----------------------------|----------------------------|
| 1. Fuel oil residuum and nongasoline-bearing crude .....               | 65,487,937                 | 67,657,050                 |
| 2. Gas oil and Diesel oil .....  | 8,958,060                  | 6,819,579                  |
| 3. Gasoline-bearing crude .....  | 33,770,339                 | 30,410,671                 |
| 4. Unblended natural gasoline .....                                    | 1,828,636                  | 2,001,204                  |
| 5. Gasoline (not including distributing and service stations) .....    | 12,384,540                 | 13,520,678                 |
| 6. Naphtha distillates .....   | *1,387,940                 | *1,464,577                 |
| 7. All other stocks .....  | *7,526,284                 | *6,166,488                 |
| Totals .....   | 131,343,736                | 128,040,247                |
| *Estimated amount of unfinished gasoline contained in item No. 6 ..... | 1,133,326                  | 1,248,291                  |
| *Coke included in item No. 7 .....                                     | 246,292                    | 22,435                     |

During 1937 the crude oil consumed in California, according to the U. S. Bureau of Mines<sup>2</sup> was 205,779,626 barrels sent to stills at the refineries; 20,801,587 barrels to foreign shipments; 121,170 barrels to intercoastal shipments; and 22,849,931 barrels were either consumed as fuel or added to residuum and nongasoline-bearing crude.

## Utilization of California's Crude Oil.

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oilfields and from these reservoirs by pipelines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

The production of petroleum products during 1936 is shown in Table F:

TABLE F

| Commodity   | Amount in<br>barrels |
|---|----------------------|
| Crude petroleum .....                                 | 205,779,262          |
| Natural gasoline including liquid petroleum gas ..... | 15,274,337           |
| Gasoline .....  | 80,579,663           |
| Kerosene .....  | 5,026,911            |
| Lubricating oils and greases .....                    | 2,567,731            |
| Gas oil and Diesel oil .....                          | 28,609,120           |
| Residuum nongasoline-bearing crude <sup>a</sup> ..... | 86,845,635           |
| Asphalt and road oils .....                           | 6,586,163            |
| Coke (in tons) .....                                  | 626,948              |
| Naphtha distillates .....                             | 1,388,102            |
| Other unfinished oils .....                           | 916,309              |
| Shortage and still gas production .....               | 6,587,133            |
| Total petroleum (net) <sup>b</sup> .....              | 243,903,944          |

<sup>a</sup> Includes 22,849,913 bbls. of heavy crude oil.

<sup>b</sup> Total of crude oil and natural gas gasoline.

<sup>1</sup> American Petroleum Institute: Summary of California Oilfield Operations for December, 1937.

<sup>2</sup> Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1937, U. S. Bureau of Mines.

### CHAPTER THREE

#### METALS

*Bibliography:* Reports of State Mineralogist I-XXXIV (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The total value of metals produced in California during 1937 was \$46,454,467. Chief among these is and always has been gold, followed by silver, copper, quicksilver, tungsten ore, lead, iron ore, platinum, and chromite.

A comparison of the 1936 output with that of the 1937 output is afforded by the following table:

| Substance                  | 1935                |              | 1936                |              | Increase+<br>Decrease-<br>Value |
|----------------------------|---------------------|--------------|---------------------|--------------|---------------------------------|
|                            | Amount              | Value        | Amount              | Value        |                                 |
| Chromite-----              | 221 tons            | \$3,314      | 1,918 tons          | \$20,830     | \$17,516+                       |
| Copper-----                | 9,991,799 lbs.      | 919,245      | 10,512,500 lbs.     | 1,272,013    | 352,768+                        |
| Gold-----                  | 1,077,442 fine ozs. | 37,710,470   | 1,174,578 fine ozs. | 41,110,230   | 3,399,760+                      |
| Iron ore-----              | *                   |              | 5,490 tons          | 29,340       | *                               |
| Lead-----                  | 1,098,545 lbs.      | 50,533       | 2,402,110 lbs.      | 141,724      | 91,191+                         |
| Platinum group metals----- | 1,134 ozs.          | 40,669       | 530 ozs.            | 23,704       | 16,965-                         |
| Quicksilver-----           | 8,758 flasks        | 671,055      | 9,985 flasks        | 837,789      | 166,734+                        |
| Silver-----                | 2,103,799 fine ozs. | 1,629,392    | 2,888,265 fine ozs. | 2,234,073    | 604,681+                        |
| Tungsten-----              | 236 tons            | 210,819      | 611 tons            | 782,187      | 571,368+                        |
| Zinc-----                  | 29,740 lbs.         | 1,487        | 39,643 lbs.         | 2,577        | 1,090+                          |
| Unapportioned-----         |                     | 155,434      |                     |              |                                 |
| Total values-----          |                     | \$41,392,418 |                     | \$46,454,467 |                                 |
| Net increase-----          |                     |              |                     |              | \$5,062,049                     |

\* Includes iron ore and manganese ore.

\* Included under 'Unapportioned.'

### ALUMINUM

*Bibliography:* Report XVIII, p. 198. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this state, being in Riverside County southeast of Corona, but as yet undeveloped.

### ANTIMONY

*Bibliography:* State Mineralogist Reports VIII, X, XII-XV (inc.), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI. Bulletins 38, 91.

During 1936 there were no shipments of antimony ore in California. The principal commercial production of antimony in California has come from Kern, Inyo and San Benito counties, and other occurrences have been noted in Nevada, Riverside, San Bernardino and Santa Clara counties. The commonest occurrence is in the form of the sulphide, stibnite; but in the Kernville and Havilah districts in Kern

County there were notable deposits of the native metal, being among the few localities of the world where native antimony has been found.

Present New York quotations (July 14, 1938) are around 14¢ per pound for Chinese (duty paid) and 11½¢ for domestic antimony.

#### Antimony Production in California, by Years.

The production of antimony ore in California by years since 1887 has been as follows:

| Year | Tons | Value    | Year   | Tons  | Value     |
|------|------|----------|--------|-------|-----------|
| 1887 | 75   | \$15,500 | 1902   |       |           |
| 1888 | 100  | 20,000   | 1915   | 510   | \$35,666  |
| 1889 |      |          | 1916   | 1,015 | 64,793    |
| 1893 | 50   | 2,250    | 1917   | 158   | 18,786    |
| 1894 | 150  | 6,000    | 1918   |       |           |
| 1895 | 33   | 1,485    | 1925   |       |           |
| 1896 | 17   | 2,320    | 1926   |       |           |
| 1897 | 20   | 3,500    | 1927   | *26   | 770       |
| 1898 | 40   | 1,200    | 1928   | 20    | 590       |
| 1899 | 75   | 13,500   | 1929   | 20    | 761       |
| 1900 | 70   | 5,700    |        |       |           |
| 1901 | 50   | 8,350    | Totals | 2,429 | \$201,171 |

\* Annual details concealed under 'Unapportioned.'

#### ARSENIC

*Bibliography:* Reports XVIII, XXIII, XXV, XXX, XXXIII. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite (FeAsS), which is frequently gold bearing; and in scorodite (FeAsO<sub>4</sub>+2H<sub>2</sub>O), an oxidation product of arsenopyrite. The occurrence of realgar (AsS) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

#### BERYLLIUM

*Bibliography:* State Mineralogist Report XXVII. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of beryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

Present (May 26, 1938) quotations for beryllium ore are per ton in carload lots, minimum 10 per cent BeO, \$30; minimum 12 per cent BeO, \$35, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

### BISMUTH

*Bibliography:* Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at \$2,400 in 1904, and credited to Riverside County.

The present quotation (June 16, 1938) for bismuth is \$1.05 per pound, in ton lots for the refined metal.

### CADMIUM

*Bibliography:* U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from California ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

The present quotation (July 28, 1937) for cadmium is 85¢ per pound for the refined metal.

### CHROMITE

*Bibliography:* State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXIII. Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During the year 1937 there were shipments of chromite or chromic iron ore in California amounting to 1,918 short tons, recalculated to a basis of 45% Cr<sub>2</sub>O<sub>3</sub>, valued at \$20,830 f.o.b. shipping point, coming from two properties in Del Norte County and one each in El Dorado, Fresno, Placer, Santa Barbara, and Tulare counties. The total shipments for 1937 were the largest since 1919. The 1936 output amounted to 221 tons worth \$3,314.

**Occurrence.**

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as peridotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

**Imports.**

Imports of foreign chromite<sup>1</sup> to the United States duty free during 1937, came mainly from Southern Rhodesia, Union of South Africa, New Caledonia, Philippine Islands, Turkey, Greece, and India. The total was 553,916 long tons, valued at \$7,324,488 for 1937, compared with 324,258 long tons worth \$4,431,898 for 1936.

**Total Chromite Production of California.**

Production of chromite in California began, apparently, about 1874, principally in San Luis Obispo County. There was considerable activity from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons), valued at \$329,924, was shipped from that county up to the beginning of 1887. Some ore also was shipped from the Tyson properties in Del Norte County. The tabulation herewith shows the output of chromite in California, annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

| Year                               | Tons   | Value     | Year              | Tons    | Value       |
|------------------------------------|--------|-----------|-------------------|---------|-------------|
| 1874-1887 (San Luis Obispo County) |        |           | 1912              | 1,270   | \$11,260    |
| 1887                               | 26,028 | \$329,924 | 1913              | 1,180   | 12,700      |
|                                    | 3,000  | 40,000    | 1914              | 1,517   | 9,434       |
| 1888                               | 1,500  | 20,000    | 1915              | 3,725   | 38,044      |
| 1889                               | 2,000  | 30,000    | 1916              | 48,943  | 717,244     |
| 1890                               | 3,599  | 53,985    | 1917              | 52,379  | 1,130,298   |
| 1891                               | 1,372  | 29,580    | 1918              | 73,955  | 3,649,497   |
| 1892                               | 1,500  | 22,500    | 1919              | *4,314  | 97,164      |
| 1893                               | 3,319  | 49,785    | 1920              | 1,770   | 43,031      |
| 1894                               | 3,680  | 39,980    | 1921              | 347     | 6,870       |
| 1895                               | 1,740  | 16,795    | 1922              | 379     | 6,334       |
| 1896                               | 786    | 7,775     | 1923              | 84      | 1,658       |
| 1897                               |        |           | 1924              | 350     | 6,700       |
| 1898                               |        |           | 1925              | 191     | 3,712       |
| 1899                               |        |           | 1926              | 393     | 7,063       |
| 1900                               | 140    | 1,400     | 1927              | 225     | 5,063       |
| 1901                               | 130    | 1,950     | 1928              | 729     | 15,179      |
| 1902                               | 315    | 4,725     | 1929              | 327     | 5,025       |
| 1903                               | 150    | 2,250     | 1930              | 84      | 1,905       |
| 1904                               | 123    | 1,845     | 1931              | 441     | 6,737       |
| 1905                               | 40     | 600       | 1932 <sup>a</sup> | 1,206   | 16,557      |
| 1906                               | 317    | 2,559     | 1933 <sup>a</sup> |         |             |
| 1907                               | 302    | 6,040     | 1934              | 294     | 3,498       |
| 1908                               | 350    | 6,195     | 1935              | 488     | 6,111       |
| 1909                               | 436    | 5,309     | 1936              | 221     | 3,314       |
| 1910                               | 749    | 9,707     | 1937              | 1,918   | 20,830      |
| 1911                               | 935    | 14,197    | Totals            | 249,243 | \$6,514,209 |

\* Recalculated to 45% Cr<sub>2</sub>O<sub>3</sub> beginning with 1919.

<sup>a</sup> Included under 'Unapportioned.'

## COBALT

*Bibliography:* Report XIV, XXXIII. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I. C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (May 26, 1938) is around 97 to 99% at \$1.92 per pound for the refined metal.

## COPPER

*Bibliography:* State Mineralogist Reports VIII-XXXIV (inc.). Bulletins 23, 50, 91.

The output of copper in California during 1937 amounted to a total of 10,512,500 pounds recoverable metal valued at \$1,272,013. This was an increased amount and value over the 1936 production which was 9,991,799 pounds worth \$919,245. The average price of copper in 1937 was 12.1¢ per pound compared with 9.2¢ in 1936; 8.3¢ in 1935; 8.0¢ in 1934; 6.4¢ in 1933; and 6.3¢ in 1932.

Copper was second to gold among the metals in California from 1896 to 1932, when it was passed in output by quicksilver and silver, and in 1933 also by tungsten, and in 1936 and 1937 by silver only.

Distribution of the 1937 output of copper in California by counties was as follows:

| County                              | Pounds     | Value       |
|-------------------------------------|------------|-------------|
| Alpine                              | 827        | \$100       |
| Amador                              | 18,579     | 2,248       |
| Butte                               | 2,545      | 308         |
| Calaveras                           | 9,703      | 1,174       |
| El Dorado                           | 65,353     | 7,908       |
| Imperial                            | 118,138    | 14,295      |
| Inyo                                | 71,080     | 8,601       |
| Kern                                | 5,504      | 666         |
| Madera                              | 2,007      | 243         |
| Mariposa                            | 11,927     | 1,443       |
| Mono                                | 13,216     | 1,599       |
| Napa                                | 1,156      | 140         |
| Nevada                              | 178,643    | 21,616      |
| Placer                              | 5,959      | 721         |
| Plumas                              | 9,879,959  | 1,195,475   |
| San Bernardino                      | 23,760     | 3,480       |
| Shasta                              | 88,985     | 10,767      |
| Sierra                              | 1,213      | 146         |
| Siskiyou                            | 1,186      | 144         |
| Tuolumne                            | 6,157      | 745         |
| Fresno, Los Angeles, and Riverside* | 1,612      | 194         |
| Totals                              | 10,512,500 | \$1,272,013 |

\*Combined to conceal the output of individual producers in each.

According to preliminary data issued by the U. S. Bureau of Mines<sup>1</sup> the smelter production of primary copper from domestic sources during 1937 amounted to 1,669,322,278 pounds, an increase of approximately 37 per cent compared with the 1936 output. The value increased approximately 80 per cent in 1937. The average price of

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Report 667, June 22, 1938.

copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents, was 12.1¢ per pound.

**Copper Production of California, by Years.**

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'<sup>1</sup> had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

**Copper Production of California, by Years**

| Year   | Pounds     | Value     | Year | Pounds        | Value         |
|--------|------------|-----------|------|---------------|---------------|
| 1882   | 826,695    | \$144,672 | 1910 | 53,721,032    | \$6,680,641   |
| 1883   | 1,600,862  | 265,743   | 1911 | 36,838,024    | 4,604,753     |
| 1884   | 876,166    | 120,911   | 1912 | 34,169,997    | 5,638,049     |
| 1885   | 469,028    | 49,248    | 1913 | 34,471,118    | 5,343,023     |
| 1886   | 430,210    | 43,021    | 1914 | 30,491,535    | 4,055,375     |
| 1887   | 1,600,000  | 192,000   | 1915 | 40,968,967    | 7,169,567     |
| 1888   | 1,570,021  | 235,303   | 1916 | 55,809,019    | 13,729,017    |
| 1889   | 151,505    | 18,180    | 1917 | 48,534,611    | 13,249,948    |
| 1890   | 23,347     | 3,502     | 1918 | 47,793,046    | 11,805,583    |
| 1891   | 3,397,405  | 424,675   | 1919 | 22,162,605    | 4,122,246     |
| 1892   | 2,980,944  | 342,808   | 1920 | 12,947,299    | 2,382,303     |
| 1893   | 239,682    | 21,571    | 1921 | 12,088,053    | 1,559,358     |
| 1894   | 738,594    | 72,456    | 1922 | 22,883,987    | 3,090,582     |
| 1895   | 225,650    | 21,901    | 1923 | 28,346,860    | 4,166,089     |
| 1896   | 1,992,844  | 199,599   | 1924 | 52,089,349    | 6,823,704     |
| 1897   | 13,638,626 | 1,540,666 | 1925 | 46,965,499    | 6,669,527     |
| 1898   | 21,543,229 | 2,475,168 | 1926 | 33,521,544    | 4,693,014     |
| 1899   | 23,915,486 | 3,990,534 | 1927 | 27,350,316    | 3,582,888     |
| 1900   | 29,515,512 | 4,748,242 | 1928 | 25,162,304    | 3,623,360     |
| 1901   | 34,931,788 | 5,501,782 | 1929 | 33,809,258    | 5,941,799     |
| 1902   | 27,860,162 | 3,239,975 | 1930 | 26,534,752    | 3,449,522     |
| 1903   | 19,113,861 | 2,520,997 | 1931 | 12,954,842    | 1,178,890     |
| 1904   | 29,974,154 | 3,969,995 | 1932 | 1,417,536     | 89,307        |
| 1905   | 16,997,489 | 2,650,605 | 1933 | 992,515       | 63,521        |
| 1906   | 28,726,448 | 5,522,712 | 1934 | 590,638       | 47,252        |
| 1907   | 32,602,945 | 6,341,387 | 1935 | 2,031,836     | 168,645       |
| 1908   | 40,868,772 | 5,350,777 | 1936 | 9,991,799     | 919,245       |
| 1909   | 65,727,736 | 8,478,142 | 1937 | 10,512,500    | 1,272,013     |
| Totals |            |           |      | 1,167,592,001 | \$184,606,943 |

**GOLD**

**Bibliography:** State Mineralogist Reports I to XXXIV (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of

<sup>1</sup> Browne, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

years in annual value by petroleum, and by natural gas from 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, including Alaska. In fact, at present, California is producing approximately 24% of the gold mined in the entire United States.

There has been a steady increase in the development of both lode and placer mines in California during the last nine years, brought about by the present economic conditions. During 1937 there were 1751 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers. There was no premium paid on gold during 1932, the price being \$20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became \$35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was \$34.95.

The production of gold in California during 1937 totaled 1,174,578 fine ounces valued at \$41,110,230, being an increase of 97,136 fine ounces over the 1936 yield. Deep or lode mines accounted for 702,272 fine ounces worth \$24,579,520, and placers (mainly bucket-line, drag-line and power-shovel dredges) produced 472,306 fine ounces worth \$16,530,710.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles White Merrill and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.

The largest production in 1937 was reported from Nevada County with an output of 308,720 fine ounces (\$10,805,200); Amador County second with 106,081 fine ounces (\$3,712,835); Sacramento County third with 102,879 fine ounces \$3,600,765); Yuba County fourth with 71,289 fine ounces (\$2,495,115); Kern County fifth with 70,431 fine ounces (\$2,465,085); followed in turn by Merced, Shasta, Calaveras, El Dorado, Placer, Butte, Siskiyou, and Mariposa counties, each with a total output worth in excess of a million dollars.

Nevada held the first place as a gold producing county with an output exceedingly that of Yuba or Amador which held first and second places respectively in 1928 with Sacramento fourth that year. Amador being in second place exceeded Sacramento County which held that place from 1931 to 1936. Sacramento was in third place. The gold from Yuba and Sacramento comes almost entirely from dredges, while that from Nevada and Amador counties comes mainly from the lode mines.

Distribution of the 1937 gold output by counties was as follows:

| County           | Number of operators* |        | Value        |
|------------------|----------------------|--------|--------------|
|                  | Lode                 | Placer |              |
| Alpine.          | 2                    |        | \$13,790     |
| Amador.          | 46                   | 23     | 3,712,835    |
| Butte.           | 13                   | 53     | 1,558,305    |
| Calaveras.       | 55                   | 59     | 1,730,435    |
| Del Norte.       |                      | 4      | 2,625        |
| El Dorado.       | 47                   | 58     | 1,719,795    |
| Fresno.          | 4                    | 3      | 8,540        |
| Humboldt.        | 2                    | 15     | 27,230       |
| Imperial.        | 12                   | 6      | 298,095      |
| Inyo.            | 83                   | 10     | 620,585      |
| Kern.            | 125                  | 10     | 2,465,085    |
| Lassen.          | 4                    |        | 21,175       |
| Los Angeles.     | 17                   | 6      | 140,070      |
| Madera.          | 15                   | 13     | 13,615       |
| Mariposa.        | 80                   | 28     | 1,025,010    |
| Merced.          |                      | 4      | 1,858,815    |
| Modoc.           | 1                    |        | 210          |
| Mono.            | 15                   |        | 182,105      |
| Monterey.        | 2                    |        | 1,960        |
| Napa.            | 1                    |        | 12,355       |
| Nevada.          | 33                   | 46     | 10,805,200   |
| Placer.          | 42                   | 98     | 1,594,320    |
| Plumas.          | 18                   | 57     | 911,610      |
| Riverside.       | 31                   | 6      | 215,040      |
| Sacramento.      |                      | 19     | 3,600,765    |
| San Bernardino.  | 97                   | 13     | 218,925      |
| San Diego.       | 5                    |        | 2,100        |
| San Joaquin.     |                      | 4      | 79,765       |
| San Luis Obispo. | 1                    | 2      | 9,625        |
| Shasta.          | 19                   | 28     | 1,773,275    |
| Sierra.          | 15                   | 51     | 934,570      |
| Siskiyou.        | 31                   | 98     | 1,055,600    |
| Stanislaus.      |                      | 3      | 603,645      |
| Trinity.         | 22                   | 60     | 703,780      |
| Tulare.          | 4                    | 2      | 1,050        |
| Tuolumne.        | 62                   | 37     | 690,555      |
| Ventura.         | 3                    |        | 1,295        |
| Yolo.            |                      | 1      | 1,330        |
| Yuba.            | 6                    | 21     | 2,495,115    |
| Totals.          | 913                  | 838    | \$41,110,230 |

\* Number does not include snipers, prospectors, and various individuals selling small lots to bullion dealers.

The following is quoted from the advance statement of gold in 1937 by courtesy of the U. S. Bureau of Mines,\* Department of Commerce:

*Gold.*—The mine production of gold in California continued its upward climb from a low point of \$8,526,703 in 1929 to \$41,110,230 in 1937, an increase of 382 per cent over the 9-year period. In value the 1937 output exceeded that in any year since 1861 and in quantity that in any year since 1883. Although the data for gold production before 1901 do not segregate placer or lode gold, it appears certain that the production of lode gold was larger in 1937 in both quantity and value than in any year in the history of the State. The quantity and value of placer gold produced are known to be higher in 1937 than in any year since 1900. Moreover, it seems probable that the placer miners have not enjoyed so good a year since unrestricted hydraulic mining flourished over 50 years ago. The 25 leading mines listed in the following table produced 60 per cent of the State total."

\* U. S. Bureau of Mines, Mineral Year Book, 1938, p. 208.

## Twenty-five Leading Gold Producers in California in 1937, in Approximate Order of Output

| Mine                          | District                 | County     | Operator                                | Source of gold |
|-------------------------------|--------------------------|------------|---|----------------|
| Empire Star Mines             | Grass Valley-Nevada City | Nevada     | Empire Star Mines Co., Ltd.             | Gold ore       |
| Idaho Maryland                | Grass Valley-Nevada City | Nevada     | Idaho Maryland Mines Corp.              | Gold ore       |
| Yuba Unit                     | Yuba River               | Yuba       | Yuba Consolidated Gold Fields           | Dredge         |
| Natomas Co.                   | Folsom                   | Sacramento | Natomas Co.                             | Dredge         |
| Lava Cap                      | Grass Valley-Nevada City | Nevada     | Lava Gold Mining Corporation            | Gold ore       |
| Capital Dredge                | Folsom                   | Sacramento | Capital Dredging Co.                    | Dredge         |
| Golden Queen                  | Mojave                   | Kern       | Golden Queen Mining Co.                 | Gold ore       |
| Carson Hill                   | Mother Lode              | Calaveras  | Carson Hill Gold Mining Corp.           | Gold ore       |
| Merced Unit                   | Snelling                 | Merced     | Yuba Consolidated Gold Fields           | Dredge         |
| Argonaut                      | Mother Lode              | Amador     | Argonaut Mining Co., Ltd.               | Gold ore       |
| Snelling Unit                 | Snelling                 | Merced     | Snelling Gold Dredging Co.              | Dredge         |
| Central Eureka and Old Eureka | Mother Lode              | Amador     | Central Eureka Mining Co.               | Gold ore       |
| La Grange Dredge No. 4        | La Grange                | Stanislaus | La Grange Gold Dredging Co.             | Dredge         |
| Big Canyon                    | West Belt                | El Dorado  | Mountain Copper Co., Ltd.               | Gold ore       |
| Walker                        | Genesee                  | Plumas     | Walker Mining Co.                       | Copper ore     |
| Cardinal                      | Chidago                  | Inyo       | Cardinal Gold Mining Co.                | Gold ore       |
| Kennedy                       | Mother Lode              | Amador     | Kennedy Mining & Milling Co.            | Gold ore       |
| Arroyo Seco                   | Mother Lode              | Amador     | Arroyo Seco Gold Dredging Co.           | Dredge         |
| Sixteen to One                | Alleghany                | Sierra     | Original Sixteen to One Mine, Inc.      | Gold ore       |
| Callahan Unit                 | Callahan                 | Siskiyou   | Yuba Consolidated Gold Fields           | Dredge         |
| Yellow Aster                  | Randsburg                | Kern       | Anglo American Mining Corporation, Ltd. | Gold ore       |
| Cosumnes Dredge               | Cosumnes River           | Sacramento | Cosumnes Gold Dredging Co.              | Dredge         |
| Starlight                     | Mojave                   | Kern       | Lodestar Mining Co.                     | Gold-silver    |
| Golden Center                 | Grass Valley-Nevada City | Nevada     | Cooley Butler                           | Gold ore       |
| Loomis Dredge                 | Ophir                    | Placer     | Gold Hill Dredging Co.                  | Dredge         |

"It will be noted that the mines occupying the first, second, and fifth place are all in the Grass Valley-Nevada City district. The list includes ten operators using connected-bucket dredges; no dragline dredge operation was large enough to qualify among the 25 leading gold producers of the State."



Gold Nuggets, value \$7,000, from an ancient channel gravel mine, Sierra County. Mined in 1938, and displayed at State Fair.

Photo by Walter W. Bradley

**Total Gold Production of California.**

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,<sup>1</sup> and possibly 1820.<sup>2</sup> On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported<sup>3</sup> to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.



Dredge of Junction City Mining Co.; Junction City, Trinity County.

Photo by Chas. V. Averill

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver"

<sup>1</sup> Hittell, T. H., History of California, Vol. II, p. 12, 1885.

<sup>2</sup> Bancroft, H. H., History of California, Vol. II, p. 417, 1886.

<sup>3</sup> Mercantile Trust Review of the Pacific, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

(1867). U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

Total Gold Production of California

| Year | Value      | Year        | Value                   |
|------|------------|-------------|-------------------------|
| 1848 | \$245,301  | 1894        | \$13,863,282            |
| 1849 | 10,151,360 | 1895        | 15,334,317              |
| 1850 | 41,273,106 | 1896        | 17,181,562              |
| 1851 | 75,938,232 | 1897        | 15,871,401              |
| 1852 | 81,294,700 | 1898        | 15,906,478              |
| 1853 | 67,613,487 | 1899        | 15,336,031              |
| 1854 | 69,433,931 | 1900        | 15,863,355              |
| 1855 | 55,485,395 | 1901        | 16,989,044              |
| 1856 | 57,509,411 | 1902        | 16,910,320              |
| 1857 | 43,628,172 | 1903        | 16,300,653              |
| 1858 | 46,591,140 | 1904        | 18,633,676              |
| 1859 | 45,846,599 | 1905        | 18,898,545              |
| 1860 | 44,095,163 | 1906        | 18,732,452              |
| 1861 | 41,884,995 | 1907        | 16,727,928              |
| 1862 | 38,854,668 | 1908        | 18,761,559              |
| 1863 | 23,501,736 | 1909        | 20,237,870              |
| 1864 | 24,071,423 | 1910        | 19,715,440              |
| 1865 | 17,930,858 | 1911        | 19,738,908              |
| 1866 | 17,123,867 | 1912        | 19,713,478              |
| 1867 | 18,265,452 | 1913        | 20,406,958              |
| 1868 | 17,555,867 | 1914        | 20,653,496              |
| 1869 | 18,229,044 | 1915        | 22,442,296              |
| 1870 | 17,458,133 | 1916        | 21,410,741              |
| 1871 | 17,477,885 | 1917        | 20,087,504              |
| 1872 | 15,482,194 | 1918        | 16,528,953              |
| 1873 | 15,019,210 | 1919        | 16,695,955              |
| 1874 | 17,264,836 | 1920        | 14,311,043              |
| 1875 | 16,876,009 | 1921        | 15,704,822              |
| 1876 | 15,610,723 | 1922        | 14,670,346              |
| 1877 | 16,501,268 | 1923        | 13,379,013              |
| 1878 | 18,839,141 | 1924        | 13,150,175              |
| 1879 | 19,626,654 | 1925        | 13,065,330              |
| 1880 | 20,030,761 | 1926        | 11,923,481              |
| 1881 | 19,223,155 | 1927        | 11,671,018              |
| 1882 | 17,146,416 | 1928        | 10,785,315              |
| 1883 | 24,316,873 | 1929        | 8,526,703               |
| 1884 | 13,600,000 | 1930        | 9,451,162               |
| 1885 | 12,661,044 | 1931        | 10,814,162              |
| 1886 | 14,716,506 | 1932        | 11,765,726              |
| 1887 | 13,588,614 | 1933        | <sup>a</sup> 15,683,075 |
| 1888 | 12,750,000 | 1934        | <sup>b</sup> 25,131,284 |
| 1889 | 11,212,913 | 1935        | <sup>c</sup> 31,165,050 |
| 1890 | 12,309,793 | 1936        | 37,710,470              |
| 1891 | 12,723,869 | 1937        | 41,110,230              |
| 1892 | 12,571,900 |             |                         |
| 1893 | 12,538,780 | Total value | \$2,015,036,191         |

<sup>a</sup> Value calculated at an average weighted price of \$25.56 per fine ounce; previously \$20.6718.

<sup>b</sup> Value calculated at an average weighted price of \$34.95 per fine ounce.

<sup>c</sup> Value \$35 per fine ounce, beginning 1935.

## IRIDIUM (see under Platinum)

## IRON ORE

*Bibliography:* State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI, XXXIII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

During 1937 shipments of iron ore were made in California coming from two properties each in Inyo and San Bernardino counties. These amounted to 5,490 short tons valued at \$29,340, as compared with 31,084 tons worth \$155,434 for 1936.

The 1936 output came from two properties in San Bernardino County and one in Santa Cruz County. The material mined during the year was magnetite and hematite from Inyo County, and hematite from San Bernardino County. The hematite was used mostly in high-iron cement with some going to foundries as a flux. Use of magnetite is not known.

There was also some high-grade limonite mined in Yuba County, but as it was used in the manufacture of pigments, it has been classed under Mineral Paints.

There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

## Iron Ore Production in California, by Years.

Total iron ore production of California, with annual amounts and values, is as follows:

| Year  | Tons   | Value    | Year              | Tons    | Value     |
|-------|--------|----------|-------------------|---------|-----------|
| 1881* | 9,273  | \$79,452 | 1917              | 2,874   | \$11,496  |
| 1882  | 2,073  | 17,766   | 1918              | 3,108   | 15,947    |
| 1883  | 11,191 | 106,540  | 1919              | 2,300   | 13,796    |
| 1884  | 4,532  | 40,983   | 1920              | 5,975   | 40,889    |
| 1885  |        |          | 1921              | 1,970   | 12,030    |
| 1886  | 3,676  | 19,250   | 1922              | 3,588   | 18,868    |
| 1887  |        |          | 1923              | 3,102   | 18,665    |
| 1893  | 250    | 2,000    | 1924              |         |           |
| 1894  | 200    | 1,500    | 1925 <sup>a</sup> | 785     | 4,710     |
| 1895  |        |          | 1926              |         |           |
| 1907  | 400    | 400      | 1927 <sup>a</sup> | 5,272   | 26,000    |
| 1908  |        |          | 1928              |         |           |
| 1909  | 108    | 174      | 1930              |         |           |
| 1910  | 579    | 900      | 1931 <sup>a</sup> | 100     | 700       |
| 1911  | 558    | 558      | 1932              |         |           |
| 1912  | 2,508  | 2,508    | 1934              |         |           |
| 1913  | 2,343  | 4,485    | 1935 <sup>a</sup> | 38,339  | 163,714   |
| 1914  | 1,436  | 5,128    | 1936              | 31,084  | 155,434   |
| 1915  | 724    | 2,584    | 1937              | 5,490   | 29,340    |
| 1916  | 3,000  | 6,000    | Totals            | 146,718 | \$901,817 |

\* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotaling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

<sup>a</sup> Annual details concealed under 'Unapportioned.'

## LEAD

*Bibliography:* State Mineralogist Reports IV, VIII-XV (inc.), XVII-XXVIII (inc.), XXX, XXXI, XXXIII, XXXIV.

The production of lead in California during 1937 amounted to a total of 2,402,110 pounds of recoverable metal valued at \$141,724 compared with the 1936 figures of 1,098,545 pounds worth \$50,533. The average price of lead in 1937 was 5.9¢ per pound compared with 4.6¢ per pound in 1936, 4.0¢ per pound in 1935, 3.7¢ per pound in 1934, 3.7¢ per pound in 1933, and 3.0¢ per pound in 1932.

Distribution of the 1937 output of lead by counties was as follows:

| County   | Pounds    | Value     |
|--|-----------|-----------|
| Alpine.....  | 6,992     | \$413     |
| Amador.....  | 7,004     | 413       |
| Calaveras.....   | 1,816     | 107       |
| El Dorado.....   | 6,011     | 355       |
| Imperial.....  | 8,210     | 484       |
| Inyo.....  | 1,908,280 | 112,589   |
| Kern.....  | 2,923     | 172       |
| Los Angeles.....   | 7,046     | 416       |
| Mono.....  | 12,938    | 763       |
| Nevada.....  | 316,006   | 18,644    |
| Placer.....  | 10,432    | 615       |
| Riverside.....   | 4,028     | 238       |
| San Bernardino.....  | 106,211   | 6,266     |
| Butte, Mariposa, Plumas, Shasta, Sierra, Siskiyou, Tuolumne, and Yuba* | 4,213     | 249       |
| Totals.....  | 2,402,110 | \$141,724 |

\*Combined to conceal the output of individual operators in each.

#### Lead Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines<sup>1</sup> during 1937 the production of primary lead in the United States was 443,142 short tons, valued at \$52,291,000 being an increase over the national production of 1936 which was 387,698 short tons worth \$35,668,000.

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Notes 652, May 6, 1938.

**Lead Production of California, by Years.**

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

**Lead Production of California, by Years.**

| Year | Pounds     | Value     | Year   | Pounds      | Value        |
|------|------------|-----------|--------|-------------|--------------|
| 1877 | 7,836,000  | \$391,800 | 1908   | 1,124,483   | \$46,663     |
| 1878 | 8,640,000  | 328,320   | 1909   | 2,685,477   | 144,897      |
| 1879 | 4,502,000  | 191,335   | 1910   | 3,016,902   | 134,082      |
| 1880 | 4,200,000  | 215,460   | 1911   | 1,403,839   | 63,173       |
| 1881 | 6,680,000  | 325,316   | 1912   | 1,370,067   | 61,653       |
| 1882 | b4,000,000 | 196,800   | 1913   | 3,640,951   | 180,202      |
| 1883 | c3,400,000 | 145,520   | 1914   | 4,697,400   | 183,198      |
| 1884 | 3,200,000  | 120,512   | 1915   | 4,796,299   | 225,426      |
| 1885 | 2,000,000  | 80,900    | 1916   | 12,392,031  | 855,049      |
| 1886 | 2,000,000  | 93,400    | 1917   | 21,651,352  | 1,862,016    |
| 1887 | d1,160,000 | 52,220    | 1918   | 13,464,869  | 956,006      |
| 1888 | 900,000    | 38,250    | 1919   | 4,139,562   | 219,397      |
| 1889 | 940,000    | 35,720    | 1920   | 4,903,738   | 392,300      |
| 1890 | 800,000    | 36,000    | 1921   | 1,149,051   | 51,707       |
| 1891 | 1,140,000  | 49,020    | 1922   | 6,511,280   | 358,120      |
| 1892 | 1,360,000  | 54,400    | 1923   | 9,934,522   | 695,416      |
| 1893 | 666,000    | 24,975    | 1924   | 4,984,387   | 398,751      |
| 1894 | 950,000    | 28,500    | 1925   | 7,352,422   | 639,661      |
| 1895 | 1,592,400  | 49,364    | 1926   | 8,067,873   | 645,429      |
| 1896 | 1,293,500  | 38,805    | 1927   | 2,748,440   | 173,151      |
| 1897 | 596,000    | 20,264    | 1928   | 1,882,795   | 109,102      |
| 1898 | 655,000    | 23,907    | 1929   | 1,428,777   | 90,014       |
| 1899 | 721,000    | 30,642    | 1930   | 3,542,796   | 176,241      |
| 1900 | 1,040,000  | 41,600    | 1931   | 3,934,240   | 145,568      |
| 1901 | 720,500    | 28,820    | 1932   | 2,418,626   | 72,480       |
| 1902 | 349,440    | 12,230    | 1933   | 772,463     | 28,553       |
| 1903 | 110,000    | 3,960     | 1934   | 804,911     | 29,655       |
| 1904 | 124,000    | 5,270     | 1935   | 1,142,405   | 45,695       |
| 1905 | 533,680    | 25,083    | 1936   | 1,008,545   | 50,533       |
| 1906 | 338,718    | 19,307    | 1937   | 2,402,110   | 141,724      |
| 1907 | 328,681    | 16,690    |        |             |              |
|      |            |           | Totals | 202,239,532 | \$11,780,262 |

<sup>a</sup> Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.

<sup>b</sup> Estimated.

<sup>c</sup> Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.

<sup>d</sup> Data from 1887 to date from reports of California State Mining Bureau.

**MANGANESE**

**Bibliography:** State Mineralogist Reports XII-XV (inc.), XVIII, XXII-XXVII (inc.), XXIX-XXXI, XXXIII. Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour. Press, Vol. 117, p. 545.

During 1937 there were no shipments of manganese ore reported in California. The material mined in 1935 came from a single property in Riverside County and was consumed in the steel mills of the State. The annual details are concealed under the 'Unapportioned' item as one operator made all the shipments.

Imports of foreign manganese ore into the United States<sup>1</sup> during 1937, mainly from Soviet Russia, Gold Coast, Cuba, and Brazil, amounted to 974,281 long tons of ore containing 464,638 tons of manganese valued at \$10,710,807, as compared with 846,648 long tons containing 415,749 long tons of manganese worth \$8,819,600.

<sup>1</sup> U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, Dec., 1937.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore (including ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese."

**Manganese Ore Production in California, by Years.**

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

| Year | Tons  | Value   | Year   | Tons   | Value       |
|------|-------|---------|--------|--------|-------------|
| 1887 | 1,000 | \$9,000 | 1912   | 22     | \$400       |
| 1888 | 1,500 | 13,500  | 1913   |        |             |
| 1889 | 53    | 901     | 1914   | 150    | 1,500       |
| 1890 | 386   | 3,176   | 1915   | 4,013  | 49,068      |
| 1891 | 705   | 3,830   | 1916   | 13,404 | 274,601     |
| 1892 | 300   | 3,000   | 1917   | 15,515 | 396,659     |
| 1893 | 270   | 4,050   | 1918   | 26,075 | 979,235     |
| 1894 | 523   | 5,512   | 1919   | 11,569 | 451,422     |
| 1895 | 880   | 8,200   | 1920   | 2,892  | 62,323      |
| 1896 | 518   | 3,415   | 1921   | 1,005  | 12,210      |
| 1897 | 504   | 4,080   | 1922   | 540    | 7,650       |
| 1898 | 440   | 2,102   | 1923   | 690    | 10,620      |
| 1899 | 295   | 3,165   | 1924   | 1,115  | 25,785      |
| 1900 | 131   | 1,310   | 1925   | 832    | 19,450      |
| 1901 | 425   | 4,405   | 1926   | 235    | 4,700       |
| 1902 | 870   | 7,140   | 1927   |        |             |
| 1903 | 1     | 25      | 1928   |        |             |
| 1904 | 60    | 900     | 1929   | 733    | 8,216       |
| 1905 |       |         | 1930   |        |             |
| 1906 | 1     | 30      | 1931   | 207    | 2,576       |
| 1907 | 1     | 25      | 1932   |        |             |
| 1908 | 321   | 5,785   | 1934   |        |             |
| 1909 | 3     | 75      | 1935   | 432    | 4,630       |
| 1910 | 265   | 4,235   | 1936   |        |             |
| 1911 | 2     | 40      | Totals | 88,883 | \$2,398,076 |

\*Annual details concealed under 'Unapportioned.'

**MOLYBDENUM**

*Bibliography:* State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX. Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses

associated with copper sulphides. The first recorded commercial shipments of molybdenum ore in California were during the war, 1916-1918. Some development work has been done on a high-grade deposit at the head of the Kaweah River, Tulare County.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present (May 26, 1938) quotations on molybdenum ores are 45¢ per pound of  $\text{MoS}_2$  contained, delivered at Pittsburgh, Pa., and on ferromolybdenum are 95¢ per pound Mo, 55%-65% Mo f.o.b. shipping point.

During 1937 there was no production of molybdenum ore reported mined in California. In 1933 and 1934 there were shipments of molybdenum concentrates in California amounting to 1432 pounds 91.23%  $\text{MoS}_2$  valued at \$306. The annual details are combined under the 'Unapportioned' item to conceal the output of either operator.

#### **Molybdenum Production of California, by Years.**

California's production of molybdenum ore by years is summarized in the following tabulation:

| Year              | Tons | Value    |
|-------------------|------|----------|
| 1916              | 8    | \$9,945  |
| 1917              | 243  | 9,014    |
| 1918              | *    | 300      |
| 1919              |      |          |
| 1933              |      |          |
| 1934 <sup>a</sup> | b    | 306      |
| Totals            | 252  | \$19,565 |

\* 300 pounds of 90%  $\text{MoS}_2$  concentrate.

<sup>a</sup> Annual details concealed under 'Unapportioned.'

<sup>b</sup> 1432 pounds of 91.23%  $\text{MoS}_2$  concentrates.

#### **NICKEL**

*Bibliography:* State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (June 16, 1938) quotations for nickel are around 35¢ per pound for the refined metal.

**OSMIUM (see under Platinum)**  
**PALLADIUM (see under Platinum)**  
**PLATINUM GROUP METALS**

*Bibliography:* State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI. Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

Platinum-group metals mined during 1937 amounted to 977.88 ounces crude, of which 578.54 ounces crude was shipped and sold, containing 530.29 fine ounces worth \$23,704. This metal came from properties in Amador, Butte, Calaveras, El Dorado, Merced, Humboldt, Nevada, Placer, Sacramento, Shasta, Trinity, and Yuba counties. Of the above sold in 1937, 216.46 fine ounces was platinum; 75.98 fine ounces was iridium; 44.31 fine ounces was osmium; 172.10 fine ounces was osiridium and 21.44 fine ounces was a mixture of ruthenium, palladium, and rhodium. The 1926 output was 1,134 ounces crude containing 1,000.02 fine ounces worth \$40,669.

Present quotations<sup>1</sup> (June 16, 1938) are platinum \$33 a fine ounce; iridium 99 per cent plus \$90 to \$100; osmium per fine ounce \$48 to \$50; palladium per fine ounce \$24; ruthenium per fine ounce \$35 to \$40; rhodium per fine ounce \$120 to \$125.

**Platinum Production of California, by Years.**

The annual production and values since 1887 have been as follows:

| Year | Ounces | Value    | Year      | Ounces | Value     |
|------|--------|----------|-----------|--------|-----------|
| 1887 | 416    | \$10,400 | 1913      | 368    | \$17,738  |
| 1888 | 100    | 400      | 1914      | 463    | 14,816    |
| 1889 | 500    | 2,000    | 1915      | 667    | 21,149    |
| 1890 | 500    | 2,000    | 1916      | 886    | 42,642    |
| 1891 | 600    | 2,500    | 1917      | 610    | 43,710    |
| 1892 | 100    | 500      | 1918      | 571    | 42,788    |
| 1893 | 80     | 440      | 1919      | 418    | 60,611    |
| 1894 | 75     | 517      | 1920      | 477    | 65,977    |
| 1895 | 100    | 600      | 1921      | 613    | 55,754    |
| 1896 | 150    | 900      | 1922      | 795    | 90,288    |
| 1897 | 162    | 944      | 1923      | 602    | 78,546    |
| 1898 | 150    | 900      | 1924      | 273    | 36,452    |
| 1899 | 300    | 1,800    | 1925      | 292    | 39,937    |
| 1900 | 300    | 1,800    | 1926      | 322    | 32,005    |
| 1901 | 400    | 2,500    | 1927      | 139    | 10,749    |
| 1902 | 250    | 3,200    | 1928      | 312    | 27,902    |
| 1903 | 39     | 468      | 1929      | 212    | 14,416    |
| 1904 | 70     | 1,052    | 1930      | 217    | 11,700    |
| 1905 | 123    | 1,849    | 1931      | 305    | 11,979    |
| 1906 | 200    | 3,320    | 1932      | 278    | 8,142     |
| 1907 | 91     | 1,647    | 1933      | 236    | 7,255     |
| 1908 | 300    | 6,255    | 1934      | 424    | 14,884    |
| 1909 | 706    | 13,414   | 1935      | 121    | 4,153     |
| 1910 | 337    | 8,386    | 1936      | 1,000  | 40,669    |
| 1911 | 511    | 14,873   | 1937      | 530    | 23,704    |
| 1912 | 603    | 19,731   | Totals... | 18,288 | \$926,371 |

\* Fine ounces, beginning with 1919.

## QUICKSILVER

*Bibliography:* State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.), XXXI, XXXIII. Bulletin 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

The production of quicksilver in California during the year 1937 was 9,995 flasks valued at \$837,789, compared with the 1936 output of 8,758 flasks worth \$671,055. Distribution of the 1937 output was as follows:

| County  | Flasks       | Value            |
|---|--------------|------------------|
| Lake.....   | 4,012        | \$341,444        |
| Napa.....   | 329          | 26,051           |
| San Benito.....   | 1,756        | 146,524          |
| San Luis Obispo.....  | 2,133        | 179,731          |
| Santa Barbara.....  | 654          | 51,140           |
| Santa Clara.....  | 257          | 21,035           |
| Sonoma.....   | 281          | 22,085           |
| Colusa, Contra Costa, Fresno, Inyo, Kern, Kings, Monterey, Siskiyou, Solano, Trinity, Yolo* | 573          | 49,779           |
| <b>Totals.....</b>  | <b>9,995</b> | <b>\$837,789</b> |

\* Combined to conceal the output of individual operators.

## Prices.

During 1937 the average for New York monthly quotations<sup>1</sup> was \$90.18 per 76-lb. flask. The average price for 1936 was \$79.917. The average price for January, 1936, was \$90.25, raising to a peak in June with an average of \$96.654 for the month then declining to the end of the year, with an average for December of \$90.25. The average price received by producers in California during 1937 was \$83.82 per 76-lb. flask, compared with \$76.62 per flask in 1936.

<sup>1</sup> U. S. Bureau of Mines, Mineral Report 661, May 21, 1938.

The U. S. Bureau of Mines<sup>1</sup> reported the total production of the United States for 1937 at 16,508 flasks valued at \$1,488,691. The national production for 1936 was 16,569 flasks worth \$1,324,194. California was by a considerable margin the largest producing state, with approximately 59 per cent of the total, other producing states being



Cloverdale Quicksilver Mine, Sonoma County. New concentrating plant above, old furnace plant below.

Photo by Walter W. Bradley

Oregon, Texas, Arkansas, Washington, Nevada, and Arizona. The 1937 imports of quicksilver amounted to 18,917 flasks valued at \$1,341,928 compared with 18,088 flasks valued at \$1,017,817 in 1936, an increase of 5 per cent. Of total imports for 1937, Spain supplied 7,042 flasks, Italy 9,832 flasks, United Kingdom 510 flasks, and Mexico 1,533 flasks.

<sup>1</sup> U. S. Bureau of Mines, Mineral Report 661, May 21, 1938.

## Total Quicksilver Production of California.

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and was in practically continuous operation from 1846 to 1921 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained  $76\frac{1}{2}$  pounds; then 75 pounds up to and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850-1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883-1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

| Year | Flasks | Value     | Average price per flask | Year   | Flasks    | Value         | Average price per flask |
|------|--------|-----------|-------------------------|--------|-----------|---------------|-------------------------|
| 1850 | 7,723  | \$768,052 | \$99.45                 | 1895   | 36,104    | \$1,337,131   | \$37.04                 |
| 1851 | 27,779 | 1,859,248 | 66.93                   | 1896   | 30,765    | 1,075,449     | 34.96                   |
| 1852 | 20,000 | 1,166,600 | 58.33                   | 1897   | 26,691    | 993,445       | 37.28                   |
| 1853 | 22,284 | 1,235,648 | 55.45                   | 1898   | 31,092    | 1,188,626     | 38.23                   |
| 1854 | 30,004 | 1,663,722 | 55.45                   | 1899   | 29,454    | 1,405,045     | 47.70                   |
| 1855 | 33,000 | 1,767,150 | 53.55                   | 1900   | 26,317    | 1,182,786     | 44.94                   |
| 1856 | 30,000 | 1,549,500 | 51.65                   | 1901   | 26,720    | 1,285,014     | 48.46                   |
| 1857 | 28,204 | 1,244,381 | 48.73                   | 1902   | 29,552    | 1,276,524     | 43.20                   |
| 1858 | 31,000 | 1,482,730 | 47.83                   | 1903   | 32,094    | 1,335,954     | 42.25                   |
| 1859 | 13,000 | 820,690   | 63.13                   | 1904   | *28,876   | 1,086,323     | 37.62                   |
| 1860 | 10,000 | 535,500   | 53.55                   | 1905   | 24,655    | 886,081       | 35.94                   |
| 1861 | 35,000 | 1,471,750 | 42.05                   | 1906   | 19,516    | 712,334       | 36.50                   |
| 1862 | 42,000 | 1,526,700 | 36.35                   | 1907   | 17,379    | 663,178       | 38.16                   |
| 1863 | 40,531 | 1,705,544 | 42.08                   | 1908   | 18,039    | 763,520       | 42.33                   |
| 1864 | 47,489 | 2,179,745 | 45.90                   | 1909   | 16,217    | 773,788       | 47.71                   |
| 1865 | 53,000 | 2,432,700 | 45.90                   | 1910   | 17,665    | 799,002       | 45.23                   |
| 1866 | 46,550 | 2,473,202 | 53.13                   | 1911   | 19,109    | 879,205       | 46.01                   |
| 1867 | 47,000 | 2,157,300 | 45.90                   | 1912   | 20,600    | 866,024       | 42.04                   |
| 1868 | 47,728 | 2,190,715 | 45.90                   | 1913   | 15,661    | 630,042       | 40.23                   |
| 1869 | 33,811 | 1,551,925 | 45.90                   | 1914   | 11,373    | 557,846       | 49.05                   |
| 1870 | 30,077 | 1,725,818 | 57.38                   | 1915   | 14,199    | 1,157,449     | 81.52                   |
| 1871 | 31,686 | 1,999,387 | 63.10                   | 1916   | 21,427    | 2,003,425     | 93.50                   |
| 1872 | 31,621 | 2,084,773 | 65.93                   | 1917   | 24,382    | 2,396,466     | 98.29                   |
| 1873 | 27,642 | 2,220,482 | 80.33                   | 1918   | 22,621    | 2,579,472     | 114.03                  |
| 1874 | 27,756 | 2,919,376 | 105.18                  | 1919   | 15,200    | 1,353,381     | 89.04                   |
| 1875 | 50,250 | 4,228,538 | 84.15                   | 1920   | 10,273    | 775,527       | 75.45                   |
| 1876 | 75,074 | 3,303,256 | 44.00                   | 1921   | 3,157     | 140,666       | 44.56                   |
| 1877 | 79,396 | 2,961,471 | 37.30                   | 1922   | 3,466     | 191,851       | 55.35                   |
| 1878 | 63,880 | 2,101,652 | 32.90                   | 1923   | 5,458     | 332,851       | 60.98                   |
| 1879 | 73,684 | 2,194,674 | 29.85                   | 1924   | 7,948     | 543,080       | 68.33                   |
| 1880 | 59,926 | 1,857,706 | 31.00                   | 1925   | 7,683     | 621,831       | 80.81                   |
| 1881 | 60,851 | 1,815,185 | 29.83                   | 1926   | 5,892     | 516,382       | 87.64                   |
| 1882 | 52,732 | 1,488,624 | 28.23                   | 1927   | 6,488     | 714,418       | 111.67                  |
| 1883 | 46,725 | 1,343,344 | 28.75                   | 1928   | b7,107    | 844,649       | 118.84                  |
| 1884 | 31,913 | 973,347   | 30.50                   | 1929   | 10,152    | 1,195,705     | 117.78                  |
| 1885 | 32,073 | 986,245   | 30.75                   | 1930   | 11,374    | 1,255,257     | 110.36                  |
| 1886 | 29,981 | 1,064,326 | 35.50                   | 1931   | 13,478    | 1,121,624     | 83.22                   |
| 1887 | 33,760 | 1,430,749 | 42.38                   | 1932   | 5,349     | 279,780       | 52.30                   |
| 1888 | 33,250 | 1,413,125 | 42.50                   | 1933   | 4,102     | 229,472       | 55.94                   |
| 1889 | 26,464 | 1,190,880 | 45.00                   | 1934   | 7,946     | 534,135       | 67.22                   |
| 1890 | 22,926 | 1,203,615 | 52.50                   | 1935   | 9,353     | 628,590       | 67.23                   |
| 1891 | 22,904 | 1,036,406 | 45.25                   | 1936   | 8,758     | 671,055       | 76.62                   |
| 1892 | 27,993 | 1,139,595 | 40.71                   | 1937   | 9,995     | 837,789       | 83.82                   |
| 1893 | 30,164 | 1,108,527 | 36.75                   | Totals | 2,392,939 | \$117,260,075 | -----                   |
| 1894 | 30,416 | 934,000   | 30.70                   |        |           |               |                         |

<sup>a</sup> Flasks of 75 lbs. from June, 1904; of  $76\frac{1}{2}$  lbs. previously.

<sup>b</sup> Flasks of 76 pounds, from January, 1928.

## SILVER

*Bibliography:* State Mineralogist Reports IV, VIII, XII-XXXIV inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1927 silver output in California totaled 2,888,265 fine ounces valued at \$2,234,073, being an increase in both amount and value over the figures of the previous year which were 2,103,799 fine ounces worth \$1,629,392. Of the 1937 yield, there was 40,481 fine ounces worth \$31,312 from placers. The average price paid for newly mined domestic silver was 77.35¢ per fine ounce in 1936, 71.875¢ in 1935, 64.6¢ in 1934, and 35¢ in 1933.

| County          | Ounces    | Value       |
|-----------------|-----------|-------------|
| Alpine          | 8,950     | \$6,923     |
| Amador          | 23,324    | 18,041      |
| Butte           | 23,728    | 18,354      |
| Calaveras       | 12,733    | 9,849       |
| Del Norte       | 10        | 8           |
| El Dorado       | 10,650    | 8,238       |
| Fresno          | 55        | 43          |
| Humboldt        | 122       | 94          |
| Imperial        | 3,287     | 2,542       |
| Inyo            | 102,003   | 78,899      |
| Kern            | 726,197   | 561,712     |
| Lassen          | 1,465     | 1,133       |
| Los Angeles     | 2,308     | 1,785       |
| Madera          | 142       | 110         |
| Mariposa        | 7,866     | 6,084       |
| Merced          | 5,525     | 4,274       |
| Modoc           | 4         | 3           |
| Mono            | 631,347   | 488,347     |
| Monterey        | 4         | 3           |
| Napa            | 66,763    | 51,641      |
| Nevada          | 506,143   | 391,502     |
| Placer          | 25,970    | 20,088      |
| Plumas          | 293,854   | 227,296     |
| Riverside       | 5,519     | 4,269       |
| Sacramento      | 4,342     | 3,359       |
| San Bernardino  | 359,201   | 277,842     |
| San Diego       | 18        | 14          |
| San Joaquin     | 162       | 125         |
| San Luis Obispo | 19        | 15          |
| Shasta          | 39,801    | 30,786      |
| Sierra          | 5,002     | 3,869       |
| Siskiyou        | 4,421     | 3,420       |
| Stanislaus      | 1,901     | 1,470       |
| Trinity         | 2,713     | 2,099       |
| Tulare          | 12        | 9           |
| Tuolumne        | 7,957     | 6,155       |
| Ventura         | 2         | 2           |
| Yolo            | 5         | 4           |
| Yuba            | 4,740     | 3,666       |
| Totals          | 2,888,265 | \$2,234,073 |

The following paragraph is quoted from the U. S. Bureau of Mines,<sup>1</sup> chapter on Gold and Silver from Mineral Year Book 1938, by courtesy of Charles White Merrill and H. M. Gaylord:

"Silver.—The bulk of the silver output in California was more localized than that of gold. The 10 leading producers listed in the following table produced 79 per cent of the State total."

<sup>1</sup>U. S. Bureau of Mines, Mineral Year Book 1938, p. 209.

## Ten Leading Silver Producers in California in 1937, in Approximate Order of Output

| Mine                  | District            | County            | Operator                          | Source of silver |
|-----------------------|---------------------|-------------------|-----------------------------------|------------------|
| Silverado...          | Mount Patterson...  | Mono...           | Sierra Consolidated Mines, Inc... | Silver ore       |
| Walker...             | Genesee...          | Plumas...         | Walker Mining Co...               | Copper ore       |
| Starlight...          | Mojave...           | Kern...           | Lodestar Mining Co...             | Gold-silver ore  |
| Lava Cap...           | Grass Valley-Nevada |                   |                                   |                  |
|                       | City                | Nevada...         | Lava Cap Gold Mining Corp...      | Gold ore         |
| Golden Queen...       | Mojave...           | Kern...           | Golden Queen Mining Co...         | Gold ore         |
| Kelly...              | Randsburg...        | San Bernardino... | Frank Royer and Barney Stauffer   | Silver ore       |
| Cactus Queen...       | Mojave...           | Kern...           | Cactus Mines Co...                | Gold-silver ore  |
| Empire Star...        | Grass Valley-Nevada | Nevada...         | Empire Star Mines Co., Ltd...     | Gold ore         |
| Grigsby (Palisade)... | City                | Napa...           | Coast Range Mining Corporation    | Silver ore       |
| Spanish...            | Calistoga...        | Nevada...         | Bradley Mining Co...              | Gold ore         |

"It will be noted that mines depending on several types of ore produced California's silver output; by-product silver from the Walker copper mine puts it in second place as a silver producer, and four companies that derive the metal as a by-product from gold ore are listed as leading silver producers. In addition to companies listed, some output of silver was reported from almost every lode and placer mine in the State."

## Silver Production of California, by Years.

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880-1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880-1896 (inc.) were based on 'coinage value' (\$1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successor, the U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

## Silver Production of California, by Years, Since 1880

| Year      | Fine oz.  | Value       | Average price per oz. | Year        | Fine oz.    | Value        | Average price per oz. |
|-----------|-----------|-------------|-----------------------|-------------|-------------|--------------|-----------------------|
| 1880..... | 882,169   | \$1,014,494 | \$1 15                | 1910.....   | 1,840,085   | \$993,646    | \$0 54                |
| 1881..... | 550,091   | 655,503     | 1 13                  | 1911.....   | 1,270,445   | 673,336      | 53                    |
| 1882..... | 653,569   | 745,069     | 1 14                  | 1912.....   | 1,300,136   | 799,554      | 615                   |
| 1883..... | 1,129,244 | 1,253,461   | 1 11                  | 1913.....   | 1,375,399   | 832,553      | 604                   |
| 1884..... | 3,236,987 | 3,593,056   | 1 11                  | 1914.....   | 1,471,859   | 813,938      | 553                   |
| 1885..... | 1,968,260 | 2,125,298   | 1 07                  | 1915.....   | 1,678,756   | 851,129      | 507                   |
| 1886..... | 1,245,747 | 1,233,290   | 99                    | 1916.....   | 2,564,354   | 1,687,345    | 658                   |
| 1887..... | 1,262,282 | 1,237,036   | 98                    | 1917.....   | 1,775,431   | 1,462,955    | 824                   |
| 1888..... | 1,314,874 | 1,235,982   | 94                    | 1918.....   | 1,427,711   | 1,427,711    | 1 00                  |
| 1889..... | 823,947   | 774,510     | 94                    | 1919.....   | 1,107,189   | 1,240,051    | 1 12                  |
| 1890..... | 820,336   | 861,353     | 1 05                  | 1920.....   | 1,706,327   | 1,859,896    | 1 09                  |
| 1891..... | 737,224   | 729,852     | 99                    | 1921.....   | 3,629,223   | 3,629,223    | 1 00                  |
| 1892..... | 358,575   | 311,960     | 87                    | 1922.....   | 3,100,065   | 3,100,065    | 1 00                  |
| 1893..... | 415,468   | 324,065     | 78                    | 1923.....   | 3,559,443   | 2,918,743    | 82                    |
| 1894..... | 229,896   | 144,834     | 63                    | 1924.....   | 3,555,133   | 2,381,952    | 67                    |
| 1895..... | 463,911   | 301,542     | 65                    | 1925.....   | 3,054,416   | 2,119,765    | 694                   |
| 1896..... | 326,757   | 222,195     | 68                    | 1926.....   | 2,022,460   | 1,262,015    | 624                   |
| 1897..... | 754,648   | 452,780     | 60                    | 1927.....   | 1,622,242   | 918,677      | 567                   |
| 1898..... | 701,788   | 414,055     | 59                    | 1928.....   | 1,475,711   | 865,051      | 555                   |
| 1899..... | 855,889   | 513,521     | 60                    | 1929.....   | 1,176,895   | 627,285      | 533                   |
| 1900..... | 1,168,157 | 724,257     | 62                    | 1930.....   | 1,622,803   | 624,779      | 385                   |
| 1901..... | 950,831   | 570,499     | 60                    | 1931.....   | 867,518     | 251,667      | 290                   |
| 1902..... | 1,163,041 | 616,412     | 53                    | 1932.....   | 493,533     | 139,176      | 282                   |
| 1903..... | 958,230   | 517,444     | 54                    | 1933.....   | 402,591     | 140,907      | 350                   |
| 1904..... | 1,441,259 | 835,929     | 58                    | 1934.....   | 844,413     | 545,883      | 544                   |
| 1905..... | 1,076,174 | 650,009     | 61                    | 1935.....   | 1,191,112   | 856,112      | 719                   |
| 1906..... | 1,220,641 | 817,830     | 68                    | 1936.....   | 2,103,799   | 1,629,392    | 775                   |
| 1907..... | 1,138,856 | 751,646     | 66                    | 1937.....   | 2,888,265   | 2,234,073    | 774                   |
| 1908..... | 1,647,278 | 873,057     | 53                    | Totals..... | \$3,763,856 | \$62,478,989 | -----                 |
| 1909..... | 2,098,253 | 1,091,092   | 52                    |             |             |              |                       |

\*Average price applied to newly mined within the United States.

## TIN

*Bibliography:* Reports XV, XVII, XVIII, XXV, XXXI. Bulletins 67, 91.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

## Total Output of Tin in California

| Year              | Pounds  | Value    |
|-------------------|---------|----------|
| 1891              | 125,280 | \$27,564 |
| 1892              | 126,000 | 32,400   |
| 1928              |         |          |
| 1929 <sup>a</sup> | 1,200   | 580      |
| Totals            | 252,489 | \$60,544 |

<sup>a</sup>Annual details concealed under 'Unapportioned.'

## TITANIUM

*Bibliography:* State Mineralogist's Report XXIII, XXXIII.

During 1936 there was no production of titanium ores reported in California. In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at \$150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The market price of titanium minerals varies as to the titanium oxide it contains. Present (Sept. 29, 1938) quotations are: Rutile 94% TiO at 10¢ a pound, ilmenite 45 to 52% TiO at \$10 to \$12 a ton, all prices Atlantic seaboard.

## TUNGSTEN

*Bibliography:* Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.) XXX. Bulletins 38, 67, 91, 95, U. S. G. S., Bull. 652, Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922 inclusive. The material shipped in 1937 was high-grade sorted ore and concentrates, coming from four properties

in Inyo County, two in San Bernardino County, and a single property each in Kern and Tulare counties. A total of 567 short tons of concentrates averaging 64.623%  $WO_3$  was reported shipped yielding 36,461 units, or 611 tons recalculated to 60%  $WO_3$  and valued at \$782,187 at the mine. The 1937 output showed an increase in both quantity and value as compared with that of 1936, which was 236 tons worth \$210,819.

Quotations in "Metal and Mineral Markets" during 1937 for Chinese wolframite duty paid started the year at \$15.75 a unit  $WO_3$ , increasing in price to the latter part of September when it was \$38 a unit  $WO_3$ , then receding to the end of the year, at \$25 a unit  $WO_3$ . Domestic scheelite started the year at \$16 a unit  $WO_3$ , in September reached \$35 a unit  $WO_3$  and ended the year at from \$22 to \$24 a unit  $WO_3$ . Present (April, 1938) prices per unit  $WO_3$  at New York are: Chinese wolframite, duty paid, \$19.50; scheelite, \$16 to \$19.

Imports of foreign tungsten ores and alloys in the United States during 1937, according to the U. S. Bureau of Foreign and Domestic Commerce, totaled 10,189,625 pounds valued at \$2,940,038, compared with 6,648,527 pounds worth \$1,529,658 in 1936. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hübnerite (manganese tungstate) also occur. The deposits at Atolia are the largest and most productive scheelite deposits known.

#### Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60%  $WO_3$ :

| Year | Tons at 60% $WO_3$ | Value     | Year              | Tons at 60% $WO_3$ | Value        |
|------|--------------------|-----------|-------------------|--------------------|--------------|
| 1905 | 57                 | \$18,800  | 1923              | 34                 | \$19,126     |
| 1906 | 485                | 189,100   | 1924              | 781                | 446,009      |
| 1907 | 287                | 120,587   | 1925              | 573                | 348,475      |
| 1908 | 105                | 37,750    | 1926              | 441                | 316,560      |
| 1909 | 577                | 190,500   | 1927              |                    |              |
| 1910 | 457                | 208,245   | 1928 <sup>a</sup> | 389                | 429,237      |
| 1911 | 387                | 127,706   | 1929              | 150                | 106,280      |
| 1912 | 572                | 206,000   | 1930 <sup>a</sup> |                    |              |
| 1913 | 559                | 234,673   | 1931 <sup>a</sup> | 120                | 82,582       |
| 1914 | 420                | 180,575   | 1932              | 26                 | 9,509        |
| 1915 | 962                | 1,005,467 | 1933              | 148                | 76,605       |
| 1916 | 2,270              | 4,571,521 | 1934              | 261                | 224,417      |
| 1917 | 2,466              | 3,079,013 | 1935              | 118                | 194,542      |
| 1918 | 1,982              | 2,832,222 | 1936              | 236                | 210,819      |
| 1919 | 214                | 219,316   | 1937              | 611                | 782,187      |
| 1920 |                    |           | Totals            | 15,697             | \$16,467,719 |

<sup>a</sup> Annual details concealed under 'Unapportioned.'

## VANADIUM

*Bibliography:* Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

Present (May 26, 1938) New York quotations for ferrovanadium are \$2.70-\$2.90 per pound of vanadium f.o.b. works, and vanadium ore  $27\frac{1}{2}\text{¢}$  per pound  $\text{V}_2\text{O}_5$  contained.

## ZINC

*Bibliography:* State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX, XXXIII, XXXIV. Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1937 amounted to 39,643 pounds valued at \$2,577, compared with the 1936 output of 29,740 pounds worth \$1,487. The 1937 output came from Inyo and San Bernardino counties.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles, and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The production of metallic zinc<sup>1</sup> at reduction plants in the United States during 1937 amounted to 608,458 short tons valued at \$79,100, of which 5,739 tons was reduced from foreign ores and 51,554 tons from secondary metal. The 1937 output was an increase over that of 1936, which was 534,341 short tons worth \$53,434.

The average price per pound for zinc in 1937 was 6.5¢ compared with 5¢ in 1936, 4¢ in 1935, and 4.3¢ in 1933.

## Total Zinc Production of California.

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

| Year | Pounds     | Value     | Year   | Pounds      | Value       |
|------|------------|-----------|--------|-------------|-------------|
| 1906 | 206,000    | \$12,566  | 1922   | 3,034,430   | \$172,963   |
| 1907 | 177,759    | 10,598    | 1923   |             |             |
| 1908 | 54,000     | 3,544     | 1924   | 3,060,000   | 198,900     |
| 1909 |            |           | 1925   | 11,546,602  | 877,542     |
| 1910 |            |           | 1926   | 20,447,559  | 1,533,568   |
| 1911 | 2,679,842  | 152,751   | 1927   | 8,625,004   | 552,000     |
| 1912 | 4,331,391  | 298,866   | 1928   |             |             |
| 1913 | 1,157,947  | 64,845    | 1929   |             |             |
| 1914 | 399,641    | 20,381    | 1931   | 149,865     | 5,314       |
| 1915 | 13,043,411 | 1,617,383 | 1932   |             |             |
| 1916 | 15,950,565 | 2,137,375 | 1933   | 290,222     | 12,189      |
| 1917 | 11,854,804 | 1,209,190 | 1934   | 721,719     | 31,034      |
| 1918 | 5,565,516  | 506,466   | 1935   | 328,013     | 14,432      |
| 1919 | 1,384,192  | 101,046   | 1936   | 29,740      | 1,487       |
| 1920 | 1,188,009  | 96,229    | 1937   | 39,643      | 2,577       |
| 1921 | 846,184    | 42,309    | Totals | 107,112,106 | \$9,675,555 |

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Report 641, April 16, 1938.

## CHAPTER FOUR

### STRUCTURAL MATERIALS

**Bibliography:** State Mineralogist Reports XII-XXXII (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1937 was valued at \$37,976,626, as compared with a total of \$38,503,997 for the year 1936. All the materials grouped under this classification showed an increased value in 1937, with the exception of bituminous rock, cement, granite, and slate.

In 1937 all counties, with the exception of Kings, contributed to this structural total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification.

The following summary shows the value of the structural materials produced in California during the years 1936-1937, with increases or decreases in each instance:

| Substance                      | 1936             |                      | 1937             |                      | Increase-<br>Decrease-<br>Value |
|--------------------------------|------------------|----------------------|------------------|----------------------|---------------------------------|
|                                | Amount           | Value                | Amount           | Value                |                                 |
| Brick and hollow building tile |                  | \$2,240,905          |                  | \$3,083,902          | \$842,997+                      |
| Cement                         | 13,300,188 bbls. | 18,314,589           | 12,072,062 bbls. | 16,546,229           | 1,768,360-                      |
| Granite                        |                  | 214,243              |                  | 207,738              | 36,505-                         |
| Lime                           | 64,275 tons      | 633,678              | 69,532 tons      | 681,277              | 47,599-                         |
| Marble <sup>a</sup>            |                  | 23,011               |                  | 23,667               | 656+                            |
| Sandstone                      |                  | 9,180                |                  | 15,680               | 6,500+                          |
| Slate                          |                  | 49,818               |                  | 32,572               | 17,246-                         |
| Stone, miscellaneous           |                  | 16,578,238           |                  | 16,917,683           | 339,445+                        |
| Unapportioned                  |                  | <sup>b</sup> 410,335 |                  | <sup>b</sup> 467,876 | 57,543+                         |
| Total values                   |                  | \$38,503,997         |                  | \$37,976,626         |                                 |
| Net increase                   |                  |                      |                  |                      | \$527,371+                      |

<sup>a</sup> Includes onyx and travertine.

<sup>b</sup> Includes bituminous rock, magnesite, tube-mill pebbles.

## ASPHALT

**Bibliography:** State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself.

However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

### BITUMINOUS ROCK

*Bibliography:* State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI, XXXI.

This material is essentially an un cemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1937 shipments of bituminous rock were made from Santa Barbara and Santa Cruz counties with a single producer in each. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The total of the 1935 and 1936 yield was 41,681 short tons valued at \$133,344. The 1937 output showed a decrease in both amount and value over that of 1936.

#### Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

| Year | Tons   | Value     | Year   | Tons      | Value       |
|------|--------|-----------|--------|-----------|-------------|
| 1887 | 36,000 | \$160,000 | 1913   | 37,541    | \$78,479    |
| 1888 | 50,000 | 257,000   | 1914   | 66,119    | 166,618     |
| 1889 | 40,000 | 170,000   | 1915   | 17,789    | 61,468      |
| 1890 | 40,000 | 170,000   | 1916   | 19,449    | 66,561      |
| 1891 | 39,962 | 154,164   | 1917   | 5,590     | 18,580      |
| 1892 | 24,000 | 72,000    | 1918   | 2,561     | 9,067       |
| 1893 | 32,000 | 192,036   | 1919   | 4,614     | 18,537      |
| 1894 | 31,214 | 115,193   | 1920   | 5,450     | 27,825      |
| 1895 | 38,921 | 121,586   | 1921   | 8,298     | 43,192      |
| 1896 | 49,456 | 122,500   | 1922   | 4,624     | 13,570      |
| 1897 | 45,470 | 128,173   | 1923   | 2,945     | 11,780      |
| 1898 | 46,836 | 137,575   | 1924   | 6,040     | 14,922      |
| 1899 | 40,321 | 116,097   | 1925   | 2,681     | 10,724      |
| 1900 | 25,306 | 71,495    | 1926   | 3,863     | 21,577      |
| 1901 | 24,052 | 66,354    | 1927   | 3,515     | 17,704      |
| 1902 | 33,490 | 43,411    | 1928   | 4,966     | 33,832      |
| 1903 | 21,944 | 53,106    | 1929   | 3,320     | 14,360      |
| 1904 | 45,280 | 175,680   | 1930   | 8,525     | 36,075      |
| 1905 | 24,753 | 60,436    | 1931   |           |             |
| 1906 | 16,077 | 45,204    | 1932*  |           |             |
| 1907 | 24,122 | 72,835    | 1933   |           |             |
| 1908 | 30,718 | 109,818   | 1934*  |           |             |
| 1909 | 34,123 | 116,436   | 1935   |           |             |
| 1910 | 87,547 | 165,711   | 1936*  |           |             |
| 1911 | 75,125 | 117,279   | 1937   |           |             |
| 1912 | 44,073 | 87,467    | Totals | 1,310,807 | \$4,139,212 |

\* Annual details concealed under 'Unapportioned.'

**BRICK AND HOLLOW TILE**

*Bibliography:* State Mineralogist Reports VIII, X, XII-XV (inc.), XVII-XXVIII (inc.), XXXII. Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5-6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius.

We also include under this heading the various forms of hollow building 'tile' or blocks. The application of this tile to residence construction as well as to other structures has grown, though their total output for 1937 showed an increase in value and tonnage as compared with the 1936 production.

The 1937 output of all kinds of brick in California showed an increase in value of 34 per cent and an increase in amount of 12 per cent as compared with that of 1936. The 1936 production consisted of 122,676 M. of common brick valued at \$1,301,825; 22,000 M. of fire brick valued at \$1,364,696; 4,157 M. of glazed, pressed fancy and vitrified paving-brick valued at \$148,203; and 17,521 tons of hollow building tile valued at \$270,078; which gave a total value for the year for brick and hollow building-tile of \$3,083,902. The 1936 output had a total value of \$2,240,905.

Los Angeles County had the largest production of brick and hollow building-tile in 1937 with fifteen companies producing 67,398 M. of common brick worth \$727,910; 11,532 M. of fire brick worth \$808,249; 1,470 M. of fancy, glazed and pressed brick worth \$50,662; and 6,355 tons of hollow building-tile worth \$45,122. Contra Costa County with three plants operating had a production of brick and hollow building-tile valued at \$497,543; Santa Clara with three plants output of brick was valued at \$219,087. There were two operating plants each in Alameda, Amador, Kern, Sacramento, San Diego, San Joaquin, and Santa Barbara counties and one each in Fresno, Humboldt, Orange, Placer, Riverside, San Bernardino, and Tulare counties. Included in the output of Alameda County was some face hollow building-tile and from Orange County was included Spanish brick.

**Brick and Hollow-Tile Production of California, by Years.**

Record of brick production in the state has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

| Year   | Brick, M   | Hollow building blocks, tons | Value         |
|--------|------------|------------------------------|---------------|
| 1893   | 103,900    |                              | \$801,750     |
| 1894   | 81,675     |                              | 457,125       |
| 1895   | 131,772    |                              | 672,360       |
| 1896   | 24,000     |                              | 524,740       |
| 1897   | 97,468     |                              | 563,240       |
| 1898   | 100,102    |                              | 571,362       |
| 1899   | 125,950    |                              | 754,730       |
| 1900   | 137,191    |                              | 905,210       |
| 1901   | 130,766    |                              | 860,488       |
| 1902   | 169,851    |                              | 1,306,215     |
| 1903   | 214,403    |                              | 1,999,546     |
| 1904   | 281,750    |                              | 1,994,740     |
| 1905   | 286,618    |                              | 2,273,786     |
| 1906   | 277,762    |                              | 2,538,548     |
| 1907   | 362,167    |                              | 3,438,951     |
| 1908   | 332,872    |                              | 2,506,495     |
| 1909   | 333,846    |                              | 3,059,929     |
| 1910   | 340,883    |                              | 2,934,731     |
| 1911   | 327,474    |                              | 2,638,121     |
| 1912   | 337,233    |                              | 2,940,290     |
| 1913   | 358,754    |                              | 2,915,350     |
| 1914   | 270,791    |                              | 2,288,227     |
| 1915   | 180,538    |                              | 1,675,756     |
| 1916   | 206,960    |                              | 2,096,570     |
| 1917   | 192,269    | 29,348                       | 2,532,721     |
| 1918   | 136,374    | 34,818                       | 2,363,481     |
| 1919   | 156,328    | 36,026                       | 3,087,067     |
| 1920   | 245,842    | 99,208                       | 5,704,393     |
| 1921   | 238,022    | 67,100                       | 5,570,875     |
| 1922   | 374,853    | 105,909                      | 7,994,991     |
| 1923   | 397,754    | 122,554                      | 9,738,082     |
| 1924   | 456,716    | 114,469                      | 9,137,908     |
| 1925   | 361,094    | 105,491                      | 7,503,976     |
| 1926   | 388,048    | 90,332                       | 7,026,124     |
| 1927   | 374,111    | 75,116                       | 6,510,077     |
| 1928   | 272,443    | 66,277                       | 5,694,770     |
| 1929   | 327,011    | 66,713                       | 5,607,410     |
| 1930   | 267,019    | 68,047                       | 4,205,460     |
| 1931   | 151,545    | 51,988                       | 2,560,415     |
| 1932   | 90,683     | 27,098                       | 1,605,086     |
| 1933   | 76,905     | 25,814                       | 1,520,481     |
| 1934   | 66,738     | 17,534                       | 1,644,661     |
| 1935   | 76,521     | 21,309                       | 1,855,343     |
| 1936   | 131,667    | 16,081                       | 2,240,905     |
| 1937   | 148,833    | 17,521                       | 3,083,902     |
| Totals | 10,445,502 | 1,258,733                    | \$140,015,688 |

## CEMENT

*Bibliography:* State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.) XXXII. Bulletin 38.

During 1937 there was a production of 12,072,062 barrels of cement in California, valued at \$16,546,229 f.o.b. plant, of which 4,339,320 barrels came from northern California plants, and 7,732,742 barrels came from southern California plants. The 1937 output was a decrease over that of 1936, which was 13,300,188 barrels worth \$18,314,589.

Shipments during 1937 were made from ten plants in nine counties to the extent of 11,721,818 barrels valued at \$16,868,379, as compared with 12,994,393 barrels worth \$18,090,256. There were five plants in operation in northern California—one each in Calaveras, Contra Costa, Merced, San Mateo, Santa Cruz counties, which shipped 4,284,965 barrels of cement; and five plants in southern California, two in San Bernardino County and one each in Kern, Los Angeles<sup>1</sup> and Riverside counties, which shipped 7,436,853 barrels of cement. There were 2,157 men employed in the above plants during the year 1937.

<sup>1</sup> The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

**Cement Production of California, by Years.**

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then \$4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to \$2.50 a barrel, about the same as it is today."<sup>1</sup>

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 annually exceeded the value of her gold output.

**Cement Production of California, by Years**

| Year | Barrels   | Value     | Year   | Barrels     | Value         |
|------|-----------|-----------|--------|-------------|---------------|
| 1891 | 5,000     | \$15,000  | 1915   | 4,918,275   | \$6,044,950   |
| 1892 | 5,000     | 15,000    | 1916   | 5,299,507   | 6,210,293     |
| 1893 |           |           | 1917   | 5,790,734   | 7,544,282     |
| 1894 | 8,000     | 21,600    | 1918   | 4,772,921   | 7,969,909     |
| 1895 | 16,383    | 32,556    | 1919   | 4,645,289   | 8,591,990     |
| 1896 | 9,500     | 28,250    | 1920   | 6,709,160   | 14,962,045    |
| 1897 | 18,000    | 66,000    | 1921   | 7,404,221   | 18,072,120    |
| 1898 | 50,000    | 150,000   | 1922   | 8,902,135   | 16,524,056    |
| 1899 | 60,000    | 180,000   | 1923   | 10,825,405  | 25,999,203    |
| 1900 | 52,000    | 121,000   | 1924   | 11,655,131  | 23,225,850    |
| 1901 | 71,800    | 159,842   | 1925   | 13,206,630  | 25,043,335    |
| 1902 | 171,000   | 423,600   | 1926   | 13,797,173  | 25,269,678    |
| 1903 | 640,868   | 968,727   | 1927   | 14,661,783  | 26,474,935    |
| 1904 | 969,538   | 1,539,807 | 1928   | 13,625,231  | 24,463,287    |
| 1905 | 1,265,553 | 1,791,916 | 1929   | 12,794,729  | 21,038,565    |
| 1906 | 1,286,000 | 1,941,250 | 1930   | 9,831,938   | 14,575,731    |
| 1907 | 1,613,563 | 2,585,577 | 1931   | 7,693,712   | 11,510,655    |
| 1908 | 1,629,615 | 2,359,692 | 1932   | 5,657,549   | 7,967,107     |
| 1909 | 3,779,205 | 4,969,437 | 1933   | 7,284,031   | 10,331,395    |
| 1910 | 5,453,193 | 7,485,715 | 1934   | 8,936,085   | 12,445,616    |
| 1911 | 6,371,369 | 9,085,625 | 1935   | 8,086,292   | 10,120,721    |
| 1912 | 6,198,634 | 6,074,661 | 1936   | 13,300,188  | 18,314,589    |
| 1913 | 6,167,906 | 7,743,024 | 1937   | 12,072,062  | 16,546,229    |
| 1914 | 5,109,218 | 6,558,148 | Totals | 252,881,426 | \$413,563,558 |

**GRANITE****Bibliography:** State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI. Bulletin 38.

The 1937 output of granite in California amounted to 45,555 cu. ft. of building stone valued at \$75,722; 34,198 cu. ft. of monumental stone valued at \$95,080; 1,100 linear ft. of curbing valued at \$2,300; and 434,545 cu. ft. of unclassified material including a small amount of tuff and volcanic rock which was used as building stone, and for flag-stone, having a value of \$34,636; giving a total value for the year's yield at \$207,738. This was a decrease from the 1936 total value which was \$244,243. The 1937 output came from seventeen quarries in thirteen counties, four of which were in San Diego County; two in Fresno County; and one each in Lassen, Los Angeles, Madera, Mari-

<sup>1</sup> Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

posa, Nevada, Placer, Plumas, Riverside, San Bernardino, Sonoma, and Ventura counties. The material from Los Angeles was a mica schist; that from Sonoma County a tuff and that from Ventura County a volcanic rock.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put. It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

#### Varieties.

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notably at Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also a similar 'black granite' in Tulare County, near Success.

#### Granite Production of California, by Years.

The value of granite produced, annually, since 1887 has been as follows:

| Year | Value     | Year  | Value        |
|------|-----------|-------|--------------|
| 1887 | \$150,000 | 1893  | \$981,277    |
| 1888 | 57,000    | 1914  | 628,786      |
| 1889 | 1,329,018 | 1915  | 227,928      |
| 1890 | 1,209,000 | 1916  | 535,339      |
| 1891 | 1,300,000 | 1917  | 221,997      |
| 1892 | 1,000,000 | 1918  | 139,861      |
| 1893 | 531,322   | 1919  | 220,743      |
| 1894 | 228,816   | 1920  | 495,732      |
| 1895 | 224,329   | 1921  | 725,901      |
| 1896 | 201,004   | 1922  | 676,643      |
| 1897 | 188,024   | 1923  | 760,081      |
| 1898 | 147,732   | 1924  | 1,211,046    |
| 1899 | 141,070   | 1925  | 1,853,859    |
| 1900 | 295,772   | 1926  | 655,332      |
| 1901 | 519,285   | 1927  | 1,398,443    |
| 1902 | 255,239   | 1928  | 763,996      |
| 1903 | 678,670   | 1929  | 1,169,271    |
| 1904 | 467,472   | 1930  | 855,477      |
| 1905 | 353,837   | 1931  | 636,741      |
| 1906 | 344,083   | 1932  | 398,676      |
| 1907 | 373,376   | 1933  | 183,706      |
| 1908 | 512,923   | 1934  | 249,083      |
| 1909 | 376,834   | 1935  | 339,917      |
| 1910 | 417,898   | 1936  | 244,243      |
| 1911 | 355,742   | 1937  | 207,738      |
| 1912 | 362,975   |       |              |
|      |           | Total | \$27,794,237 |

## LIME

*Bibliography:* Reports XIV, XV, XVII-XXIX (inc.), XXXIII, Bulletin 38.

In California during 1937 there was an output of lime amounting to 69,532 short tons valued at \$681,277, coming from two plants each in El Dorado and San Bernardino counties; and one each in Alameda, Santa Cruz, Sonoma, and Tuolumne counties. The above figures showed an increase in both amount and value over those of 1936 which were 64,275 tons worth \$633,678.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not separable. A portion is hydrated lime. Limestone utilized in sugar making, for smelter flux, as a fertilizer, and other special industrial uses, is classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

**Lime Production of California, by Years.**

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels', as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.):

| Year | Tons   | Value     | Year   | Tons      | Value        |
|------|--------|-----------|--------|-----------|--------------|
| 1894 | 37,350 | \$318,700 | 1917   | 50,073    | \$311,380    |
| 1895 | 39,776 | 386,094   | 1918   | 43,684    | 461,315      |
| 1896 | 30,275 | 261,505   | 1919   | 42,070    | 552,043      |
| 1897 | 28,780 | 252,900   | 1920   | 46,314    | 557,232      |
| 1898 | 29,786 | 254,010   | 1921   | 46,353    | 610,619      |
| 1899 | 29,985 | 314,575   | 1922   | 57,875    | 671,747      |
| 1900 | 31,252 | 283,699   | 1923   | 70,894    | 788,834      |
| 1901 | 31,738 | 334,688   | 1924   | 62,029    | 703,355      |
| 1902 | 44,866 | 369,616   | 1925   | 61,922    | 685,528      |
| 1903 | 49,659 | 418,280   | 1926   | 63,568    | 670,837      |
| 1904 | 57,945 | 571,749   | 1927   | 60,498    | 631,497      |
| 1905 | 61,700 | 555,322   | 1928   | 56,616    | 547,919      |
| 1906 | 68,927 | 763,060   | 1929   | 42,834    | 417,101      |
| 1907 | 68,422 | 756,376   | 1930   | 47,662    | 452,054      |
| 1908 | 39,639 | 379,243   | 1931   | 36,189    | 360,523      |
| 1909 | 52,075 | 577,824   | 1932   | 27,510    | 254,223      |
| 1910 | 47,951 | 477,683   | 1933   | 33,425    | 271,619      |
| 1911 | 42,959 | 390,988   | 1934   | 32,500    | 309,765      |
| 1912 | 52,212 | 464,440   | 1935   | 59,731    | 573,212      |
| 1913 | 61,344 | 528,547   | 1936   | 64,275    | 633,678      |
| 1914 | 43,996 | 378,663   | 1937   | 69,532    | 681,277      |
| 1915 | 35,653 | 285,304   | Totals | 2,111,308 | \$20,860,529 |
| 1916 | 49,364 | 390,475   |        |           |              |

### MAGNESITE

**Bibliography:** State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1937 came from a single property each in Santa Clara and Stanislaus counties, both being operated by the same company. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of this single operator. Practically all was shipped in the calcined form.

The output for 1937 showed an increase in both quantity and value over that of 1936. The 1936-1937 production showed a total of 94,491 short tons of crude magnesite valued at \$734,443, of which only a small amount was sold as such. Most of this material was calcined. The operators' reports showed that a total of 39,364 short tons of calcined material valued at \$1,016,843 rail-shipping point, was made during 1936-1937 and was both dead-burned and periclase for refractories, and material for the plastic trade. From two to two and one-half tons of crude material are required to make one ton of calcined. The average price of crude magnesite reported in 1937 was \$8.25 per ton, compared with \$7.25 per ton in 1936, \$6.70 per ton in 1935, \$6.50 per ton in 1934, \$5.60 per ton in 1933, and \$10.00 per ton in 1932.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property.

#### Imports.

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick  $\frac{3}{4}$ ¢ per lb., and 10 per cent ad valorem. The figures of imports for 1937, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 58,853 short tons valued at \$857,780 as compared with 44,863 tons worth \$713,371 in 1936.

#### Total Magnesite Production of California.

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,<sup>1</sup> southeast of Livermore, Alameda County. Shipments amounting to

<sup>1</sup> See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

| Year | Tons   | Value   | Year   | Tons      | Value        |
|------|--------|---------|--------|-----------|--------------|
| 1887 | 600    | \$9,000 | 1913   | 9,632     | \$77,056     |
| 1888 | 600    | 9,000   | 1914   | 11,438    | 114,380      |
| 1889 | 600    | 9,000   | 1915   | 30,271    | 283,461      |
| 1890 | 600    | 9,000   | 1916   | 154,052   | 1,311,893    |
| 1891 | 1,500  | 15,000  | 1917   | 200,648   | 1,976,227    |
| 1892 | 1,500  | 15,000  | 1918   | 83,974    | 803,492      |
| 1893 | 1,093  | 10,930  | 1919   | 44,696    | 452,094      |
| 1894 | 1,440  | 10,240  | 1920   | 83,695    | 1,033,491    |
| 1895 | 2,200  | 17,000  | 1921   | 47,837    | 511,102      |
| 1896 | 1,500  | 11,000  | 1922   | 55,637    | 594,665      |
| 1897 | 1,143  | 13,671  | 1923   | 73,963    | 946,643      |
| 1898 | 1,263  | 19,075  | 1924   | 67,236    | 900,183      |
| 1899 | 1,280  | 18,480  | 1925   | 64,623    | 872,944      |
| 1900 | 2,252  | 19,333  | 1926   | 50,915    | 587,642      |
| 1901 | 4,726  | 43,057  | 1927   | 46,093    | 577,887      |
| 1902 | 2,830  | 20,655  | 1928   | 45,645    | 501,590      |
| 1903 | 1,361  | 20,515  | 1929   | 47,269    | 488,014      |
| 1904 | 2,850  | 9,298   | 1930   | 38,681    | 388,472      |
| 1905 | 3,933  | 16,221  | 1931   | 21,576    | 182,283      |
| 1906 | 4,032  | 40,320  | 1932   | 40,303    | 282,325      |
| 1907 | 6,405  | 57,720  | 1933   | -         | -            |
| 1908 | 10,582 | 80,822  | 1934   | -         | -            |
| 1909 | 7,942  | 62,588  | 1935   | -         | -            |
| 1910 | 16,570 | 113,887 | 1936   | 62,509    | 413,228      |
| 1911 | 8,858  | 67,430  | 1937   | 94,491    | 734,443      |
| 1912 | 10,512 | 105,120 | Totals | 1,482,806 | \$14,856,877 |

\* Combined under 'Unapportioned.'

## MARBLE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.). Bulletin 38. U. S. Bur. of Mines Bull. 106.

The 1937 production of marble in California was valued at \$23,667 (including some onyx and travertine from San Bernardino County, and a small amount of limestone used as building stone and flagstone coming from a single operator each in Los Angeles, San Luis Obispo, and Santa Barbara counties). The marble came from a single quarry in Tuolumne County. The 1937 output showed an increase in value over that of 1936, which was worth \$23,011.

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

## Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

## Total Production of Marble in California, by Years

| Year | Cubic feet | Value   | Year  | Cubic feet | Value       |
|------|------------|---------|-------|------------|-------------|
| 1887 |            | \$5,000 | 1913  | 41,654     | \$113,282   |
| 1888 |            | 5,000   | 1914  | 25,436     | 48,832      |
| 1889 |            | 87,030  | 1915  | 22,186     | 41,518      |
| 1890 |            | 80,000  | 1916  | 25,954     | 50,280      |
| 1891 |            | 100,000 | 1917  | 24,755     | 62,950      |
| 1892 |            | 115,000 | 1918  | 17,428     | 49,898      |
| 1893 |            | 40,000  | 1919  | 25,020     | 74,482      |
| 1894 | 38,441     | 98,326  | 1920  | 19,531     | 92,899      |
| 1895 | 14,864     | 56,566  | 1921  | 30,232     | 98,395      |
| 1896 | 7,889      | 32,415  | 1922  | 35,321     | 127,792     |
| 1897 | 4,102      | 7,280   | 1923  | 28,045     | 124,919     |
| 1898 | 8,050      | 23,594  | 1924  | 61,579     | 140,253     |
| 1899 | 9,682      | 10,550  | 1925  | 35,664     | 116,105     |
| 1900 | 4,103      | 5,891   | 1926  | 34,806     | 119,999     |
| 1901 | 2,945      | 4,630   | 1927  | 42,308     | 103,689     |
| 1902 | 19,305     | 37,616  | 1928  | 34,324     | 82,190      |
| 1903 | 84,624     | 97,354  | 1929  | 72,881     | 93,661      |
| 1904 | 55,401     | 94,208  | 1930  | 65,775     | 82,194      |
| 1905 | 73,303     | 129,450 | 1931  | 37,776     | 81,760      |
| 1906 | 31,400     | 75,800  | 1932  | 25,506     | 42,505      |
| 1907 | 37,512     | 118,066 | 1933  | 9,039      | 23,178      |
| 1908 | 18,653     | 47,665  | 1934  | 7,185      | 10,759      |
| 1909 | 79,600     | 238,400 | 1935  | (b)        | 9,884       |
| 1910 | 18,960     | 50,200  | 1936  | (b)        | 23,011      |
| 1911 | 20,201     | 54,103  | 1937  | (b)        | 23,667      |
| 1912 | 27,820     | 74,120  | Total |            | \$3,526,366 |

<sup>a</sup> Includes onyx and serpentine.

<sup>b</sup> Includes onyx and travertine.

## ONYX and TRAVERTINE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI. Bulletin 38.

Onyx and travertine are known to exist in a number of places in California, but there has been only a small and irregular production since the year 1896. In 1937 there were two producers of onyx in San Bernardino County. The 1937 output showed an increase in both quantity and value over that of 1936, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen desk sets, and other ornamental purposes.

## Onyx Production of California, by Years.

Production by years has been as follows:

| Year | Value  | Year        | Value     |
|------|--------|-------------|-----------|
| 1887 | *      | 1923        | \$2,510   |
| 1888 | \$900  | 1924        | *         |
| 1889 | 900    | 1925        | 16,120    |
| 1890 | 900    | 1926        | 7,575     |
| 1891 | 1,500  | 1927        | *         |
| 1892 | 2,400  | 1928        | *         |
| 1893 | 1,800  | 1929        | *         |
| 1894 | 27,000 | 1930        | *         |
| 1895 | 20,000 | 1931        | *         |
| 1896 | 12,000 | 1932        | *         |
| 1918 | 24,000 | 1933        | *         |
| 1919 | *      | 1934        | *         |
| 1920 |        | 1935        | *         |
| 1921 | 1,294  | 1936        | *         |
| 1922 | 3,320  | 1937        | *         |
|      |        | Total value | \$122,219 |

## SANDSTONE

*Bibliography:* State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1937 a total of 73,190 cu. ft. of sandstone valued at \$15,680 was quarried in California, and came from three properties in Monterey County and one each in Los Angeles, San Luis Obispo, and Sonoma counties.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

## Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

| Year | Cubic feet | Value     | Year        | Cubic feet | Value       |
|------|------------|-----------|-------------|------------|-------------|
| 1887 |            | \$175,000 | 1913        | 62,227     | \$27,870    |
| 1888 |            | 150,000   | 1914        | 111,691    | 45,322      |
| 1889 |            | 175,598   | 1915        | 63,350     | 8,438       |
| 1890 |            | 100,000   | 1916        | 17,270     | 10,271      |
| 1891 |            | 100,000   | 1917        | 31,090     | 7,074       |
| 1892 |            | 50,000    | 1918        | 900        | 400         |
| 1893 |            | 26,314    | 1919        | 5,400      | 3,720       |
| 1894 |            | 113,592   | 1920        | 10,500     | 2,300       |
| 1895 |            | 35,373    | 1921        | 10,150     | 2,112       |
| 1896 |            | 28,379    | 1922        | 900        | 1,100       |
| 1897 |            | 24,086    | 1923        | 7,000      | 13,000      |
| 1898 |            | 46,384    | 1924        | 6,700      | 3,600       |
| 1899 | 56,264     | 103,384   | 1925        | 14,704     | 14,362      |
| 1900 | 378,468    | 254,140   | 1926        | 34,100     | 17,500      |
| 1901 | 266,741    | 192,132   | 1927        | 222,900    | 205,400     |
| 1902 | 212,123    | 142,506   | 1928        | 134,100    | 43,250      |
| 1903 | 253,002    | 555,309   | 1929        | 177,655    | 49,881      |
| 1904 | 363,487    | 567,181   | 1930        | 160,704    | 56,404      |
| 1905 | 302,813    | 453,268   | 1931        | 110,244    | 30,960      |
| 1906 | 182,076    | 164,068   | 1932        | 41,793     | 13,286      |
| 1907 | 159,573    | 148,148   | 1933        | 25,980     | 10,888      |
| 1908 | 93,301     | 55,151    | 1934        | 21,738     | 14,245      |
| 1909 | 79,240     | 37,032    | 1935        | 38,426     | 9,268       |
| 1910 | 165,971    | 80,443    | 1936        | 24,705     | 9,180       |
| 1911 | 255,313    | 127,314   | 1937        | 73,190     | 15,680      |
| 1912 | 66,487     | 22,574    | Total value |            | \$4,602,787 |

## SERPENTINE

*Bibliography:* State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switch-

boards. As there was but a single operator, the figures were combined with those of marble output for those years.

#### Serpentine Production of California, by Years.

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Serpentine Production in California, by Years

| Year | Cubic feet | Value   | Year   | Cubic feet | Value    |
|------|------------|---------|--------|------------|----------|
| 1895 | 4,000      | \$4,000 | 1904   | 200        | \$2,310  |
| 1896 | 1,500      | 6,000   | 1905   |            |          |
| 1897 | 2,500      | 2,500   | 1906   | 847        | 1,694    |
| 1898 | 750        | 3,000   | 1907   | 1,000      | 3,000    |
| 1899 | 500        | 2,000   | 1917   | a          | a        |
| 1900 | 350        | 2,000   | 1918   | b          | b        |
| 1901 | 89         | 890     | 1919   |            |          |
| 1902 | 512        | 5,065   | Totals | 12,347     | \$33,259 |
| 1903 | 99         | 800     |        |            |          |

<sup>a</sup> Under 'Unapportioned.'

<sup>b</sup> See under Marble.

#### SLATE

*Bibliography:* State Mineralogist Reports XV, XVIII, XXIV, XXVIII. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California during 1937 amounted to 5,036 short tons and 440 squares, having a total value of \$32,572 f.o.b. quarry and came from properties in Calaveras, El Dorado, Los Angeles, Inyo, and Tuolumne counties.

The 1937 figures showed a decrease in both amount and value over those of 1936 which were 12,252 tons and 65 squares having a total value of \$49,818. Practically all the slate was crushed and used for roofing granules. The slate shingles came from Calaveras County, and that from Los Angeles County was sold as flagstone.

**Total Production of Slate in California.**

A complete record of amount and value of slate produced in California follows:

| Year | Squares | Value    | Year  | Squares | Value       |
|------|---------|----------|-------|---------|-------------|
| 1889 | 4,500   | \$18,089 | 1910  | 1,000   | \$8,000     |
| 1890 | 4,000   | 24,000   | 1911  | 1,000   | 5,000       |
| 1891 | 4,000   | 24,000   | 1915  | 1,000   |             |
| 1892 | 3,500   | 21,000   | 1916  | 8       | 80          |
| 1893 | 3,000   | 21,000   | 1920  |         |             |
| 1894 | 1,800   | 11,700   | 1921  |         |             |
| 1895 | 1,350   | 9,450    | 1922  | 200     | 2,400       |
| 1896 | 500     | 2,500    | 1923  |         |             |
| 1897 | 400     | 2,800    | 1926  | (a)     | 7,371       |
| 1898 | 400     | 2,800    | 1927  | b2,686  | 17,960      |
| 1899 | 810     | 5,900    | 1928  | b4,075  | 31,263      |
| 1900 | 3,500   | 26,250   | 1929  |         |             |
| 1901 | 5,100   | 38,250   | 1930* | b8,220  | 71,347      |
| 1902 | 4,000   | 30,000   | 1931  |         |             |
| 1903 | 10,000  | 70,000   | 1932* | b8,234  | 55,182      |
| 1904 | 6,000   | 50,000   | 1933  | b5,343  | 31,958      |
| 1905 | 4,000   | 40,000   | 1934  | b5,065  | 24,245      |
| 1906 | 10,000  | 100,000  | 1935  | (a)     | 40,912      |
| 1907 | 7,000   | 60,000   | 1936  | (a)     | 49,818      |
| 1908 | 6,000   | 60,000   | 1937  | (a)     | 32,572      |
| 1909 | 6,961   | 45,660   | Total |         | \$1,046,507 |

\* Annual details concealed under 'Unapportioned.'

• Quantity not shown as both 'squares' and 'tons' included.

b Tons.

**MISCELLANEOUS STONE**

*Bibliography:* State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1937 the output of sand and gravel and that of crushed rock showed an increase in both amount and value over that of the previous year. There was a total value of \$16,917,683 for 'miscellaneous stone' during 1937, compared with \$16,578,238 for 1936. As in the past, Los Angeles County led in the annual output of these

products, its 1937 yield being worth \$8,655,018; Alameda County second with an output worth \$1,361,781; Contra Costa County third with an output worth \$518,760; Sacramento County with an output worth \$513,699; followed in turn by San Benito, Riverside, San Diego, San Bernardino, Marin, and Santa Clara counties.

#### Paving Blocks.

During 1937 there were no paving blocks reported produced in California.

There was a small output of paving blocks in California during 1934 coming from a single property each in Napa and Sacramento counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

| Year | Amount M | Value     | Year              | Amount M | Value       |
|------|----------|-----------|-------------------|----------|-------------|
| 1887 | *10,000  | \$350,000 | 1912              | 11,018   | \$578,355   |
| 1888 | 10,500   | 367,500   | 1913              | 6,364    | 363,505     |
| 1889 | 7,303    | 297,236   | 1914              | 6,053    | 270,598     |
| 1890 | 7,000    | 245,000   | 1915              | 3,285    | 171,092     |
| 1891 | 5,000    | 150,000   | 1916              | 1,322    | 54,362      |
| 1892 | *3,000   | 96,000    | 1917              | 938      | 38,567      |
| 1893 | 2,770    | 96,950    | 1918              | 372      | 17,000      |
| 1894 | 2,517    | 66,981    | 1919              | 27       | 1,350       |
| 1895 | 2,332    | 73,338    | 1920              | 63       | 3,155       |
| 1896 | 4,161    | 77,584    | 1921              | 4        | 280         |
| 1897 | 1,711    | 35,235    | 1922              | 72       | 3,024       |
| 1898 | 1,144    | 21,725    | 1923              | 15       | 880         |
| 1899 | 305      | 7,861     | 1924              | 11       | 935         |
| 1900 | 1,192    | 23,775    | 1925              | 27       | 1,350       |
| 1901 | 1,920    | 41,075    | 1926              |          |             |
| 1902 | 3,502    | 112,437   | 1927              | 41       | 2,057       |
| 1903 | 4,854    | 134,642   | 1928              | 25       | 1,658       |
| 1904 | 3,977    | 161,752   | 1929              |          |             |
| 1905 | 3,408    | 134,347   | 1930              |          |             |
| 1906 | 4,203    | 173,432   | 1931 <sup>a</sup> | 66       | 5,900       |
| 1907 | 4,604    | 199,347   | 1932              |          |             |
| 1908 | 7,660    | 334,780   | 1934              | 2        | 75          |
| 1909 | 4,503    | 199,803   | 1935              |          |             |
| 1910 | 4,434    | 198,916   |                   |          |             |
| 1911 | 4,141    | 210,819   | Totals            | 135,840  | \$5,325 578 |

\* Figures for 1887-1892 (inclusive) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.

<sup>a</sup> Annual details concealed under 'Unapportioned.'

**Grinding-Mill Pebbles.**

The 1937 output of grinding-mill pebbles in California is combined under the 'Unapportioned' item to conceal the production of a single operator in Siskiyou County.

The amount and value of grinding-mill pebbles, annually, follows:

| Year | Tons   | Value   | Year   | Tons   | Value     |
|------|--------|---------|--------|--------|-----------|
| 1915 | 340    | \$2,810 | 1928   | 372    | \$2,408   |
| 1916 | 20,232 | 107,567 | 1929   |        |           |
| 1917 | 21,450 | 90,538  | 1930*  | 166    | 1,225     |
| 1918 | 8,628  | 61,268  | 1931   |        |           |
| 1919 | 2,607  | 19,272  | 1932*  | 25     | 211       |
| 1920 | 2,104  | 17,988  | 1933   |        |           |
| 1921 | 247    | 1,418   | 1934*  | 300    | 3,018     |
| 1922 | 1,571  | 7,628   | 1935   |        |           |
| 1923 | 2,650  | 14,936  | 1936*  | 961    | 8,356     |
| 1924 | 434    | 2,969   | 1937   |        | *         |
| 1925 | 215    | 1,385   |        |        |           |
| 1926 | 102    | 612     | Totals | 62,602 | \$275,409 |
| 1927 | 288    | 1,800   |        |        |           |

\* Annual details concealed under 'Unapportioned.'

**Sand and Gravel.**

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.



Healdsburg gravel plant of Basalt Rock Co. on Russian River, Healdsburg, Sonoma County

Photo by Walter W. Bradley

The distribution of the 1937 output of sand and gravel by counties is given in the following table:

| County   | Tons       | Value       |
|--|------------|-------------|
| Alameda (a)  | 1,525,254  | \$1,055,019 |
| Butte  | 78,593     | 40,405      |
| Calaveras  | 8,976      | 5,000       |
| Contra Costa (a)   | 219,772    | 150,569     |
| Fresno   | 140,732    | 99,393      |
| Glenn  | 325,715    | 88,928      |
| Humboldt   | 238,565    | 70,596      |
| Imperial   | 180,241    | 182,619     |
| Kern   | 172,120    | 57,872      |
| Lake   | 65,030     | 17,258      |
| Lassen   | 70,418     | 31,984      |
| Los Angeles (b)  | 4,984,714  | 2,239,220   |
| Mariposa   | 11,886     | 7,630       |
| Modoc  | 42,418     | 20,781      |
| Mono   | 122,603    | 87,253      |
| Monterey (a) (b) (c)   | 224,915    | 206,700     |
| Napa   | 9,250      | 4,812       |
| Nevada   | 122,952    | 84,326      |
| Orange   | 213,371    | 103,544     |
| Plumas   | 37,106     | 19,808      |
| Riverside (a) (b)  | 202,114    | 163,497     |
| Sacramento (a)   | 305,247    | 208,438     |
| San Bernardino   | 519,584    | 271,528     |
| San Diego (a) (b) (c)  | 298,784    | 255,833     |
| San Joaquin  | 161,066    | 88,624      |
| Santa Clara  | 197,769    | 86,129      |
| Sierra   | 1,495      | 868         |
| Siskiyou   | 55,153     | 31,169      |
| Stanislaus   | 84,315     | 57,147      |
| Tehama   | 30,677     | 17,406      |
| Tulare   | 118,453    | 77,578      |
| Tuolumne   | 2,581      | 1,785       |
| Ventura  | 250,883    | 154,890     |
| Yolo (a)   | 93,469     | 40,765      |
| Yuba   | 99,435     | 57,195      |
| Alpine, Amador, Colusa, Del Norte, El Dorado, Inyo, Madera, Marin, Mendocino,<br>Merced, Placer, San Benito, San Francisco, San Luis Obispo (a), San Mateo (a),<br>Santa Barbara, Santa Cruz, Shasta, Solano, Sonoma, Sutter, Trinity* | 1,090,534  | 587,407     |
| Totals.....  | 12,303,190 | \$6,673,976 |

\* Combined to conceal the output of individual operators in each.

a Includes molding sand.

b Includes blast sand.

c Includes filter sand.

Included in the above is a total of 58,489 tons of molding sand valued at \$131,906 coming from two properties in Contra Costa County; and one each in Alameda, Monterey, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo, and Ventura counties. The 1937 yield showed an increase compared with 1936 which was 49,887 tons worth \$124,333.

#### Crushed Rock.

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

## MISCELLANEOUS STONE

## Crushed Rock Production, by Counties, for 1937

| County  | Macadam and ballast |           | Rubble and riprap |          | Concrete |          | Unclassified |            | Totals     |              |
|---|---------------------|-----------|-------------------|----------|----------|----------|--------------|------------|------------|--------------|
|   | Tons                | Value     | Tons              | Value    | Tons     | Value    | Tons         | Value      | Tons       | Value        |
| Alameda   | 162,860             | \$125,645 |                   |          | 63,725   | \$63,842 | \$117,275    | 24,436     | \$306,762  |              |
| Butte   | 67,920              | 40,635    |                   |          | 18,443   | 18,443   | 119,748      | 18,748     | 178,886    |              |
| Calaveras   | 3,058               | 2,390     |                   |          |          |          | *            | *          | 2,390      | 3,058        |
| Contra Costa  | 152,938             | 133,270   | 33,250            | \$35,195 | *        | *        |              |            | 336,206    |              |
| El Dorado   | 9,981               | 11,130    | 931               | 3,275    | *        | *        |              |            | 169,741    | 383,119      |
| Imperial  |                     |           |                   |          |          |          | 20,482       | 15,382     | 10,912     | 44,405       |
| Inyo  |                     |           |                   |          |          |          | 704          | 1,619      | 20,482     | 15,362       |
| Kern  |                     |           |                   |          |          |          | 1,733        | 13,998     | 143,065    | 179,885      |
| Lassen  |                     |           |                   |          |          |          | 1,500        | 1,500      | 51,600     | 31,273       |
| Los Angeles   |                     |           |                   |          |          |          | 5,247,947    | 11,457,538 | 6,445,798  |              |
| Madera  |                     |           |                   |          |          |          | *            | *          | 3,351      | 2,275        |
| Marin   |                     |           |                   |          |          |          |              |            | 280,099    | 255,133      |
| Marysville  |                     |           |                   |          |          |          |              |            | 57,653     |              |
| Merced  |                     |           |                   |          |          |          |              |            | 10,548     | 16,597       |
| Mendocino   |                     |           |                   |          |          |          |              |            | 14,300     | 14,600       |
| Napa  |                     |           |                   |          |          |          |              |            | 127,238    | 135,254      |
| Nevada  |                     |           |                   |          |          |          |              |            | 44,000     | 44,000       |
| Plumas  |                     |           |                   |          |          |          |              |            | 1,170      | 1,170        |
| Riverside   |                     |           |                   |          |          |          |              |            | 1,509      | 1,509        |
| Sacramento  |                     |           |                   |          |          |          |              |            | 170,342    | 172,354      |
| San Bernardino  |                     |           |                   |          |          |          |              |            | 194,487    |              |
| San Diego   |                     |           |                   |          |          |          |              |            | 299,261    |              |
| San Mateo   |                     |           |                   |          |          |          |              |            | 21,999     | 27,309       |
| Santa Clara   |                     |           |                   |          |          |          |              |            | 63,175     |              |
| Shasta  |                     |           |                   |          |          |          |              |            | 57,106     |              |
| Sierra  |                     |           |                   |          |          |          |              |            | 75,580     |              |
| Siskiyou  |                     |           |                   |          |          |          |              |            | 137,721    |              |
| Sonoma  |                     |           |                   |          |          |          |              |            | 151,824    |              |
| Tejano  |                     |           |                   |          |          |          |              |            | 103,914    |              |
| Tehama  |                     |           |                   |          |          |          |              |            | 61,612     |              |
| Tuolumne  |                     |           |                   |          |          |          |              |            | 35,224     |              |
| Ventura   |                     |           |                   |          |          |          |              |            | 167,386    |              |
| Fresno, Glenn, San Benito, San Luis Obispo <sup>a</sup> , Santa Clara, Santa Cruz, San Joaquin <sup>a</sup> , Napa, San Bernardino, San Mateo, Sonoma <sup>a</sup> , Contra Costa, El Dorado, Fresno, Glenn, Marin, Merced, Riverside, Sacramento, San Benito, San Bernardo, San Francisco, Santa Clara, Santa Cruz, Sonoma, Tulare <sup>a</sup> , Calaveras, Fresno, Madera, Merced, Nevada, Orange <sup>b</sup> , Riverside, Sacramento, San Benito, San Bernardo, San Francisco, Santa Clara, Santa Cruz, Sonoma, Santa Cruz, Solano, Sonoma, Tuolumne, Ventura, Yuba <sup>a</sup> |                     |           |                   |          |          |          |              |            | 167,386    | 72,350       |
| Totals  |                     |           |                   |          |          |          |              |            | 47,706     | 53,100       |
|   |                     |           |                   |          |          |          |              |            | 57,330     |              |
|   |                     |           |                   |          |          |          |              |            | 87,704     |              |
|   |                     |           |                   |          |          |          |              |            | 54,135     |              |
|   |                     |           |                   |          |          |          |              |            | 38,221     |              |
|   |                     |           |                   |          |          |          |              |            | 888,322    |              |
|   |                     |           |                   |          |          |          |              |            | 78,590     | 186,064      |
|   |                     |           |                   |          |          |          |              |            | 177,191    |              |
|   |                     |           |                   |          |          |          |              |            | 344,812    |              |
|   |                     |           |                   |          |          |          |              |            | 340,220    |              |
|   |                     |           |                   |          |          |          |              |            | 344,812    |              |
|   |                     |           |                   |          |          |          |              |            | 15,651,550 | \$10,243,707 |

\* Combined to conceal output of a single operator in each.

<sup>a</sup> Includes granite for roofing and terrazzo.

<sup>b</sup> Includes decomposed granite.

<sup>d</sup> Includes slag.

<sup>e</sup> Includes volcanic cinder.

**Miscellaneous Stone Production of California, by Years.**

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

**Crushed Rock, Sand and Gravel, by Years**

| Year | Tons       | Value     | Year   | Tons        | Value         |
|------|------------|-----------|--------|-------------|---------------|
| 1893 | 371,000    | \$456,075 | 1916   | 9,951,089   | \$4,009,500   |
| 1894 | 661,900    | 664,838   | 1917   | 8,069,271   | 3,505,662     |
| 1895 | 1,254,688  | 1,095,939 | 1918   | 6,641,144   | 3,325,889     |
| 1896 | 960,619    | 839,884   | 1919   | 6,919,188   | 3,675,322     |
| 1897 | 821,123    | 600,112   | 1920   | 9,792,122   | 6,782,414     |
| 1898 | 1,177,365  | 814,477   | 1921   | 10,914,145  | 7,834,640     |
| 1899 | 964,898    | 786,892   | 1922   | 13,049,644  | 10,366,231    |
| 1900 | 789,287    | 561,642   | 1923   | 19,840,301  | 15,379,838    |
| 1901 | 530,396    | 641,037   | 1924   | 21,451,129  | 15,962,476    |
| 1902 | 2,056,015  | 1,249,529 | 1925   | 23,819,137  | 17,407,113    |
| 1903 | 2,215,625  | 1,673,591 | 1926   | 24,987,606  | 19,859,261    |
| 1904 | 2,296,898  | 1,641,877 | 1927   | 25,126,691  | 18,912,994    |
| 1905 | 2,624,257  | 1,716,770 | 1928   | 27,471,794  | 17,328,044    |
| 1906 | 1,555,372  | 1,418,406 | 1929   | 27,104,618  | 17,840,159    |
| 1907 | 2,288,888  | 1,915,015 | 1930   | 23,514,168  | 16,430,027    |
| 1908 | 3,998,945  | 3,241,774 | 1931   | 15,848,313  | 11,848,531    |
| 1909 | 5,531,561  | 2,708,326 | 1932   | 11,361,564  | 7,183,643     |
| 1910 | 5,827,828  | 2,777,690 | 1933   | 11,181,156  | 6,871,581     |
| 1911 | 6,487,223  | 3,610,357 | 1934   | 16,148,275  | 7,131,330     |
| 1912 | 8,044,937  | 4,532,598 | 1935   | 9,041,876   | 5,571,041     |
| 1913 | 9,817,616  | 4,823,056 | 1936   | 28,528,079  | 16,578,238    |
| 1914 | 9,288,397  | 3,960,973 | 1937   | 28,254,740  | 16,917,683    |
| 1915 | 10,879,497 | 4,609,278 | Totals | 439,460,485 | \$297,064,843 |

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.

## INDUSTRIAL MATERIALS

### CHAPTER FIVE

**Bibliography:** State Mineralogist Reports XII-XXXIII (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have a clearly defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

In 1937 the mineral zircon was added to this group. The material mined was used as an abrasive and a refractory.

This group, as a whole, showed an increase in total value from \$5,236,534 in 1936 to \$6,154,918 in 1937.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1936 and 1937.

| Substance                         | 1936             |             | 1937             |             | Increase +<br>Decrease<br>Value |
|-----------------------------------|------------------|-------------|------------------|-------------|---------------------------------|
|                                   | Amount           | Value       | Amount           | Value       |                                 |
| Bentonite.....                    | 10,185 tons      | \$165,131   | 8,425 tons       | \$140,261   | \$24,870—                       |
| Clay (pottery).....               | 382,823 tons     | 646,920     | 354,669 tons     | 705,200     | 58,280—                         |
| Dolomite.....                     |                  |             | 12,371 tons      | 24,603      | *                               |
| Feldspar.....                     | 3,430 tons       | 24,959      | 2,656 tons       | 10,930      | 14,029—                         |
| Gems.....                         | 2,878            |             |                  | 2,075       | 803—                            |
| Gypsum.....                       | 143,549 tons     | 282,703     | 186,160 tons     | 384,431     | 101,728+                        |
| Limestone.....                    | 295,792 tons     | 661,757     | 351,755 tons     | 830,562     | 168,805+                        |
| Mineral Water.....                | 19,348,513 gals. | 777,899     | 18,309,729 gals. | 1,130,810   | 352,911+                        |
| Pumice and volcanic ash.....      | 17,132 tons      | 143,709     | 10,392 tons      | 79,005      | 64,704—                         |
| Silica (glass, sand, quartz)..... | 77,830 tons      | 310,278     | 84,313 tons      | 348,987     | 38,709+                         |
| Talc and soapstone.....           | 25,643 tons      | 309,287     | 29,657 tons      | 347,772     | 38,485+                         |
| Unapportioned.....                |                  | \$1,911,013 |                  | b2,155,232  | 244,269+                        |
| Total values.....                 |                  | \$5,236,534 |                  | \$6,159,918 |                                 |
| Net increase.....                 |                  |             |                  |             | \$923,384+                      |

\* Included under 'Unapportioned.'

Includes barite, carbon dioxide, diatomite, dolomite, mica, mineral paint, pyrite, sillimanite-andalusite-cyanite group, sulphur.

b Includes barite, carbon dioxide, diatomite, fluorite, mica, mineral paint, pyrite, sillimanite-andalusite-cyanite group, sulphur, zircon.

## ASBESTOS

*Bibliography:* State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1937 there was no asbestos reported produced in California. In 1934 there was a small output of this material coming from a property in Napa County, and was used in roofing and plaster. The 1934 annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

## Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

| Year | Tons | Value   | Year   | Tons  | Value     |
|------|------|---------|--------|-------|-----------|
| 1887 | 30   | \$1,800 | 1912   | 90    | \$2,700   |
| 1888 | 30   | 1,800   | 1913   | 47    | 1,175     |
| 1889 | 30   | 1,800   | 1914   | 51    | 1,530     |
| 1890 | 71   | 4,260   | 1915   | 143   | 2,860     |
| 1891 | 66   | 3,960   | 1916   | 145   | 2,380     |
| 1892 | 30   | 1,830   | 1917   | 136   | 10,225    |
| 1893 | 50   | 2,500   | 1918   | 229   | 9,903     |
| 1894 | 50   | 2,250   | 1919*  | 131   | 6,240     |
| 1895 | 25   | 1,000   | 1920   |       |           |
| 1896 |      |         | 1921   | 410   | 19,275    |
| 1897 |      |         | 1922   | 50    | 1,800     |
| 1898 | 10   | 200     | 1923   | 20    | 200       |
| 1899 | 30   | 750     | 1924   | 70    | 4,750     |
| 1900 | 50   | 1,250   | 1925*  | 25    | 1,650     |
| 1901 | 110  | 4,400   | 1926   |       |           |
| 1902 |      |         | 1927*  | 13    | 1,160     |
| 1903 |      |         | 1928   |       |           |
| 1904 | 10   | 162     | 1929*  | 219   | 6,175     |
| 1905 | 112  | 2,625   | 1930   |       |           |
| 1906 | 70   | 3,500   | 1931   |       |           |
| 1907 | 70   | 3,500   | 1932*  | 309   | 3,274     |
| 1908 | 70   | 6,100   | 1934   |       |           |
| 1909 | 65   | 6,500   | 1935   |       |           |
| 1910 | 200  | 20,000  | 1936   |       |           |
| 1911 | 125  | 500     | Totals | 3,392 | \$145,984 |

\* Annual details concealed under 'Unapportioned.'

## BARITE

*Bibliography:* State Mineralogist Reports XXII, XIV, XV, XVII, XXI-XXVIII (inc.). Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Cire. 6221, 6223.

During 1937 the barite produced in California came from two properties in Mariposa County, the annual details being concealed in the 'Unapportioned' item so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, in heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

Commercial production of barite in California for 1936 and 1937 amounted to a total of 41,882 short tons valued at \$245,393 f.o.b. rail shipping point.

The Tariff Act of 1930 placed a duty on foreign imported barite ore, crude or unmanufactured, of \$4 per ton; ground or otherwise manufactured, of \$7.50 per ton.

Present quotations for barite (93% BaSO<sub>4</sub>) vary from \$6 to \$7 (California \$7) per ton, crude, f.o.b. rail-shipping point. Most barite has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, has given the largest commercial production to date, in part witherite (barium carbonate, BaCO<sub>3</sub>). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit.

#### Total Barite Production of California.

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

| Year | Tons  | Value   | Year   | Tons    | Value       |
|------|-------|---------|--------|---------|-------------|
| 1910 | 860   | \$5,640 | 1924   |         |             |
| 1911 | 309   | 2,207   | 1925   |         |             |
| 1912 | 564   | 2,812   | 1926   |         |             |
| 1913 | 1,600 | 3,680   | 1927   |         |             |
| 1914 | 2,000 | 3,000   | 1928   |         |             |
| 1915 | 410   | 620     | 1929   |         |             |
| 1916 | 1,606 | 5,516   | 1930   |         |             |
| 1917 | 4,420 | 25,633  | 1931   |         |             |
| 1918 | 100   | 1,500   | 1932   |         |             |
| 1919 | 1,501 | 18,065  | 1933   |         |             |
| 1920 | 3,029 | 20,795  | 1934   |         |             |
| 1921 | 901   | 4,809   | 1935   |         |             |
| 1922 | 3,370 | 18,925  | 1936)* |         |             |
| 1923 | 2,925 | 16,058  | 1937)  |         |             |
|      |       |         | Totals | 237,925 | \$1,376,243 |

\* Annual details concealed under 'Unapportioned.'

#### BENTONITE (Fuller's Earth)

*Bibliography:* State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.). Bulletins 38, 91. U. S. Bureau of Mines, Bulletin 71. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

During 1937 there was produced and shipped in California, 8,425 short tons of bentonite (fuller's earth) valued at \$140,261, coming from six properties—four in San Bernardino and one each in Inyo, and San Benito counties. The 1937 output, as compared with that of 1936 showed a decrease in amount and value, which was 10,185 tons, worth \$165,131.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is employed in uses that can not be classed as 'fuller's earth' and therefore had been classified in these reports under pottery clay. This was somewhat confusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthy, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of \$1.50 a ton on foreign produced imported fuller's earth.

#### Bentonite Production of California, by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

| Year | Tons  | Value    | Year   | Tons    | Value       |
|------|-------|----------|--------|---------|-------------|
| 1899 | 620   | \$12,400 | 1919   | 385     | \$3,810     |
| 1900 | 500   | 3,750    | 1920   | 600     | 6,000       |
| 1901 | 1,000 | 19,500   | 1921   | 1,185   | 8,295       |
| 1902 | 987   | 19,246   | 1922   | 6,606   | 48,756      |
| 1903 | 250   | 4,750    | 1923   | 3,650   | 55,125      |
| 1904 | 500   | 9,500    | 1924   | 5,290   | 67,295      |
| 1905 | 1,344 | 38,000   | 1925   | 5,280   | 91,842      |
| 1906 | 440   | 10,500   | 1926   | 23,552  | 250,192     |
| 1907 | 100   | 1,000    | 1927   | 13,018  | 154,764     |
| 1908 | 50    | 1,000    | 1928   | 53,232  | 501,743     |
| 1909 | 459   | 7,385    | 1929   | 15,541  | 170,563     |
| 1910 | 340   | 3,820    | 1930   | 12,522  | 177,964     |
| 1911 | 466   | 5,294    | 1931   | 13,960  | 222,553     |
| 1912 | 876   | 6,500    | 1932   | 4,295   | 57,670      |
| 1913 | 460   | 3,700    | 1933   | 4,605   | 60,621      |
| 1914 | 760   | 5,928    | 1934   | 6,168   | 69,325      |
| 1915 | 692   | 4,002    | 1935   | 10,204  | 68,372      |
| 1916 | 110   | 550      | 1936   | 10,185  | 165,131     |
| 1917 | 220   | 2,180    | 1937   | 8,425   | 140,261     |
| 1918 | 37    | 333      | Totals | 192,013 | \$1,815,561 |

#### CALCIUM SILICATE

*Bibliography:* Mining and Metallurgy: Oct., 1935.

During 1936 there were no commercial shipments of calcium silicate reported in California. In 1934 there was production coming from a single property in Kern County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of the single operator.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radamacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wool. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass.

Pyroxene is a silicate of calcium and magnesium and is found in crystalline limestones near the contact with intrusive igneous rocks and in basic igneous rocks such as gabbros. It is white to various shades of green, brown to black, having a hardness of 5 to 6 and a specific gravity 3.2 to 3.6.

Wollastonite is a calcium metasilicate ( $\text{CaSiO}_3$ ) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of  $4\frac{1}{2}$  to 5 and a specific gravity of about 2.9.

Calcium silicate from 1934 to 1936 was classed in California mineral production reports as wollastonite.

#### CARBON DIOXIDE GAS

*Bibliography:* State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells. The 1937 figures are combined under the 'Unapportioned' item to conceal the output of a single producer.

Carbon Dioxide Gas Production in California, by Years

| Year        | M cubic feet | Value    |
|-------------|--------------|----------|
| 1894.....   | 80           | \$4,072  |
| 1895.....   | 800          | 12,000   |
| 1896.....   | 81           | 1,300    |
| 1897.....   |              |          |
| 1933.....   |              |          |
| 1934}*..... | 15,440       | 1,822    |
| 1935.....   |              |          |
| 1936}*..... | 89,777       | 64,787   |
| 1937}*..... |              |          |
| Totals..... | 106,178      | \$83,981 |

\* Annual details concealed under 'Unapportioned.'

#### CLAY (Pottery)

*Bibliography:* State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXIII (inc.). Bulletins 38, 99. Preliminary Report No. 7. U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these 21 contributed in 1937. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods,

and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.



Porcelain Fountain in State Fair Grounds, made of California Clays

Photo by Walter W. Bradley

During 1937 there was a total of 61 properties in 21 counties which reported an output of 354,669 short tons of pottery clay valued at \$705,200 f.o.b. rail-shipping point for the crude material, as compared with 49 properties in 19 counties producing 382,823 tons, worth \$646,920 in 1936.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data sent in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1937 is shown herewith:

Pottery Clay in 1937

| County  | Tons    | Value     | Used in the manufacture of  |
|---|---------|-----------|---|
| Alameda.....  | 5,506   | \$9,412   | Roofing, floor, and mantel tile; chimney, drain, and sewer pipe. Prepared clay and various.   |
| Amador <sup>a</sup> .....   | 66,397  | 107,212   | Architectural terra cotta; fire clay and refractories; chimney; drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.  |
| Kern <sup>b</sup> .....   | 42,628  | 130,482   | Floor and fancy tile, sanitary ware, art pottery, China, and oil-well drilling-mud.   |
| Los Angeles.....  | 17,828  | 15,083    | Red earthenware; chimney, drain and sewer pipe; vents; floor, mantel, and roofing tile; art pottery; and various.   |
| Orange.....   | 29,415  | 84,513    | Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and various.   |
| Placer.....   | 70,960  | 107,138   | Architectural terra cotta; chimney, drain and sewer pipe; faience; floor, mantel, and roofing tile; red earthenware; electrical porcelain; sanitary ware; and various.  |
| Riverside.....  | 64,462  | 117,798   | Conduit, sewer, and drain pipe; red earthenware; faience, floor, mantel, and roofing tile; and various.   |
| San Bernardino.....   | 5,765   | 50,252    | Roofing, floor and mantel tile; drain and sewer pipe; red earthenware; refractories; fire-sand and various.   |
| Santa Clara.....  | 3,182   | 5,560     | Sewer pipe; art pottery; drain, floor, mantel, and roofing tile; stoneware; and various.  |
| Ventura <sup>b</sup> .....  | 8,927   | 6,425     | Oil-well drilling-mud.  |
| Calaveras, Contra Costa, Fresno, Humboldt, Imperial, Marin, San Diego, San Luis Obispob <sup>b</sup> , Sonoma, Stanislaus, Sutter*..... | 39,599  | 71,025    | Drain, roofing, and mantel tile; saggers; electrical porcelain; refractories; red earthenware, garden furniture; oil-well drilling-mud; sewer, drain, and conduit pipe; prepared clay, light weight aggregate; and various. |
| Totals.....   | 354,660 | \$705,200 |   |

<sup>a</sup> Includes firesand.

<sup>b</sup> Includes clay and shale used for oil-well drilling-mud.

\* Combined to conceal the output of single operators in each.

## POTTERY CLAY PRODUCTS

The value of the various pottery clay products made in California during 1937, totaled \$11,307,859, compared with \$9,886,209 in 1936. The distribution for 1937 is shown in the following tabulation:

| Product   | Number<br>producers | Tons   | Value        |
|---|---------------------|--------|--------------|
| Architectural terra cotta, chimney pipe and flue lining.....  | 11                  | 11,079 | \$547,998    |
| Drain pipe.....   | 18                  | 7,377  | 136,200      |
| Roofing tile.....   | 21                  | 46,193 | 713,529      |
| Floor, faience, mantel, and hand-made tile.....   | 27                  |        | 2,603,893    |
| Sewer pipe.....   | 10                  | 60,498 | 1,475,083    |
| Red earthenware.....  | 6                   |        | 148,112      |
| Stoneware and chemical stoneware.....   | 6                   |        | 418,183      |
| Electrical porcelain.....   | 4                   |        | 238,308      |
| Conduit pipe.....   | 4                   |        | 140,777      |
| Fire clay and high temperature cement.....  | 7                   | 13,472 | 142,857      |
| Chinaware.....  | 3                   |        | 1,929,552    |
| Sanitary ware and plumbing fixtures.....  | 3                   |        | 1,952,711    |
| Art pottery.....  | 4                   |        | 79,861       |
| Miscellaneous: chimney accessories, gas-stove radiants, porcelain shapes, gas-house tank-blocks, grog, molding clay, segment blocks and liners, vents, glass tank blocks and liners, light aggregate, glazed kitchenware, quarries, swimming-pool gutters, fire clay shapes, and specialties..... | 17                  |        | 780,795      |
| Total value.....  |                     |        | \$11,307,859 |

All the above clay products in 1937 showed an increased total value with the exception of architectural terra cotta and red earthenware over that of the previous year.

## Pottery Clay Production of California, by Years.

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

| Year      | Tons    | Value    | Year        | Tons       | Value        |
|-----------|---------|----------|-------------|------------|--------------|
| 1887..... | 75,000  | \$37,500 | 1913.....   | 231,179    | \$261,273    |
| 1888..... | 75,000  | 37,500   | 1914.....   | 179,948    | 167,552      |
| 1889..... | 75,000  | 37,500   | 1915.....   | 157,866    | 133,724      |
| 1890..... | 100,000 | 50,000   | 1916.....   | 134,636    | 146,538      |
| 1891..... | 100,000 | 50,000   | 1917.....   | 166,298    | 154,602      |
| 1892..... | 100,000 | 50,000   | 1918.....   | 112,423    | 166,788      |
| 1893..... | 24,556  | 67,284   | 1919.....   | 135,708    | 245,019      |
| 1894..... | 28,475  | 35,073   | 1920.....   | 203,997    | 440,689      |
| 1895..... | 37,660  | 39,685   | 1921.....   | 225,120    | 362,172      |
| 1896..... | 41,907  | 62,900   | 1922.....   | 277,232    | 473,184      |
| 1897..... | 24,592  | 30,290   | 1923.....   | 376,863    | 697,841      |
| 1898..... | 28,947  | 33,747   | 1924.....   | 417,928    | 651,857      |
| 1899..... | 40,600  | 42,700   | 1925.....   | 537,587    | 674,376      |
| 1900..... | 59,636  | 60,956   | 1926.....   | 801,461    | 806,509      |
| 1901..... | 55,679  | 39,144   | 1927.....   | 867,419    | 872,661      |
| 1902..... | 67,933  | 74,163   | 1928.....   | 887,807    | 1,394,950    |
| 1903..... | 90,972  | 99,907   | 1929.....   | 839,949    | 1,127,527    |
| 1904..... | 84,149  | 81,952   | 1930.....   | 935,586    | 795,517      |
| 1905..... | 133,305 | 130,146  | 1931.....   | 332,680    | 408,931      |
| 1906..... | 167,267 | 162,283  | 1932.....   | 167,284    | 204,890      |
| 1907..... | 160,385 | 254,454  | 1933.....   | 141,629    | 211,711      |
| 1908..... | 208,042 | 325,147  | 1934.....   | 190,510    | 245,900      |
| 1909..... | 299,424 | 465,647  | 1935.....   | 240,014    | 377,969      |
| 1910..... | 249,028 | 324,099  | 1936.....   | 382,823    | 646,920      |
| 1911..... | 224,576 | 252,759  | 1937.....   | 354,669    | 705,200      |
| 1912..... | 199,605 | 215,683  | Totals..... | 12,054,154 | \$15,434,819 |

## DIATOMITE (Diatomaceous Earth)

*Bibliography:* State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI, XXXIII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp. 1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds) and extremely porous, chalk-like material composed of pure silicea (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The Santa Barbara material is diatomaceous and is of a superior quality, particularly for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Fresno, Kern, Los Angeles, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma and Tehama counties.

As about 70 per cent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were six operators during 1937 in Los Angeles, Monterey, and Santa Barbara counties. The shipments during the year showed an increase in total tonnage and value compared with 1936.

The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.

**Total Production of Diatomite in California.**

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

| Year | Tons  | Value   | Year   | Tons      | Value        |
|------|-------|---------|--------|-----------|--------------|
| 1889 | 39    | \$1,335 | 1914   | 12,840    | \$80,350     |
| 1890 |       |         | 1915   | 12,400    | 62,000       |
| 1891 |       |         | 1916   | 15,322    | 80,649       |
| 1892 |       |         | 1917   | 24,301    | 127,510      |
| 1893 | 50    | 2,000   | 1918   | 35,963    | 189,459      |
| 1894 | 51    | 2,040   | 1919   | 40,200    | 217,800      |
| 1895 |       |         | 1920   | 60,764    | 1,056,260    |
| 1896 |       |         | 1921   |           |              |
| 1897 | 5     | 200     | 1922   |           | *90,739      |
| 1898 |       |         | 1923   |           | 1,016,675    |
| 1899 |       |         | 1924   |           | *193,064     |
| 1900 |       |         | 1925   |           | 5,729,736    |
| 1901 |       |         | 1926   |           |              |
| 1902 | 422   | 2,532   | 1927   |           | *275,403     |
| 1903 | 2,703 | 16,015  | 1928   |           | 1,995,923    |
| 1904 | 6,950 | 112,282 | 1929   |           |              |
| 1905 | 3,000 | 15,000  | 1930   |           | *300,017     |
| 1906 | 2,430 | 14,400  | 1931   |           | 4,848,661    |
| 1907 | 2,531 | 28,948  | 1932   |           |              |
| 1908 | 2,950 | 32,012  | 1933   |           | *203,228     |
| 1909 | 500   | 3,500   | 1934   |           | 3,104,154    |
| 1910 | 1,843 | 17,617  | 1935   |           |              |
| 1911 | 2,194 | 19,670  | 1936   |           | *200,908     |
| 1912 | 4,129 | 17,074  | 1937   |           | 4,243,572    |
| 1913 | 8,645 | 35,968  | Totals | 1,593,591 | \$22,933,557 |

\* Annual details concealed under 'Unapportioned.'

### DOLOMITE

*Bibliography:* State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI, XXXIII.

The 1937 output of dolomite in California amounted to 12,371 short tons valued at \$24,603. This came from four properties—one each in Inyo, Los Angeles, Monterey, and San Benito counties. The 1937 production showed a decrease in amount and value as compared with that of 1936, which was 25,807 tons, worth \$63,122.

The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco dash-coat, terrazzo, art stone, for the manufacture of  $\text{CO}_2$ , and mineral wool.

#### Dolomite Production of California, by Years.

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

| Year | Tons   | Value    | Year   | Tons    | Value       |
|------|--------|----------|--------|---------|-------------|
| 1915 | 4,192  | \$14,504 | 1928   | 38,379  | \$85,342    |
| 1916 | 13,313 | 46,566   | 1929   | 58,644  | 156,928     |
| 1917 | 27,911 | 66,416   | 1930*  | 66,564  | 161,245     |
| 1918 | 24,560 | 79,441   | 1931/  |         |             |
| 1919 | 24,502 | 67,953   | 1932   | 35,275  | 40,956      |
| 1920 | 42,388 | 132,791  | 1933   | 54,456  | 176,575     |
| 1921 | 31,195 | 99,155   | 1934)* | 108,645 | 304,984     |
| 1922 | 52,409 | 114,911  | 1935/  |         |             |
| 1923 | 69,519 | 142,615  | 1936   | 25,807  | 63,122      |
| 1924 | 28,843 | 71,271   | 1937   | 12,371  | 24,603      |
| 1925 | 42,852 | 104,900  | Totals |         |             |
| 1926 | 68,640 | 119,313  |        | 976,441 | \$2,153,033 |
| 1927 | 45,976 | 79,442   |        |         |             |

\* Annual details concealed under 'Unapportioned.'

### FELDSPAR

*Bibliography:* State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI. Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

The output of feldspar in California during 1937 amounted to 2,686 short tons valued at \$10,930 and came from two properties in San Diego County, and one in Fresno County. The 1937 production was a decrease in quantity and value as compared with that of 1936 which was 3,430 tons worth \$24,959.

**Total Feldspar Production in California.**

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

| Year | Tons   | Value   | Year   | Tons    | Value     |
|------|--------|---------|--------|---------|-----------|
| 1910 | 760    | \$5,720 | 1925   | 8,165   | \$59,615  |
| 1911 | 740    | 4,560   | 1926   | 7,300   | 56,400    |
| 1912 | 1,382  | 6,180   | 1927   | 10,932  | 86,101    |
| 1913 | 2,129  | 7,850   | 1928   | 14,628  | 93,745    |
| 1914 | 3,530  | 16,565  | 1929   | 13,327  | 78,404    |
| 1915 | 1,800  | 9,000   | 1930   | 5,014   | 35,654    |
| 1916 | 2,630  | 14,350  | 1931   | 4,795   | 59,921    |
| 1917 | 11,792 | 46,411  | 1932   | 2,294   | 15,988    |
| 1918 | 4,132  | 22,061  | 1933   |         |           |
| 1919 | 1,272  | 12,965  | 1934*  | 2,655   | 30,611    |
| 1920 | 4,518  | 26,189  | 1935   | 3,265   | 21,855    |
| 1921 | 4,349  | 28,343  | 1936   | 3,430   | 24,959    |
| 1922 | 4,587  | 37,109  | 1937   | 2,686   | 10,930    |
| 1923 | 11,100 | 81,800  | Totals |         |           |
| 1924 | 9,055  | 68,112  |        | 143,267 | \$961,393 |

\* Annual details concealed under 'Unapportioned.'

**FLUORSPAR**

*Bibliography:* State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

The 1937 output of fluorspar in California came from a single property in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. This material was shipped to steel mills to be used as a flux. The combined production of 1933 and 1934 amounted to a total of 227 tons worth \$3,631.

Fluorspar, or calcium fluoride,  $\text{CaF}_2$ , is one of the most important nonmetallic minerals from an industrial standpoint. About 80 per cent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at \$991 was shipped from Riverside County.

Present quotations (Metal and Mineral Markets) are: not less than 85 per cent  $\text{CaF}_2$  and not over 5 per cent  $\text{SiO}_2$ , \$18 to \$19 per ton; No. 2 lamp, \$21 per ton.

**GEMS**

*Bibliography:* State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX-XXXII (inc.). Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones

are gathered and marketed, for the most part in a small way. The gem material reported in California during 1937 had a total value of \$2,075. This output came from Imperial, Modoc, Napa, San Diego, Santa Clara, Siskiyou and Tulare counties and consisted of jasper, iceland spar, iridescent obsidian, rhodonite, californite, tourmaline, and onyx (chaledony). The above showed a decrease as compared with that of 1936 which was worth \$2,878.

**Total Production of Gem Materials in California.**

The value of the gem output in California annually since the beginning of commercial production is as follows:

| Year | Value    | Year  | Value       |
|------|----------|-------|-------------|
| 1900 | \$20,500 | 1920  | \$38,056    |
| 1901 | 40,000   | 1921  | 10,954      |
| 1902 | 162,100  | 1922  | 1,312       |
| 1903 | 110,500  | 1923  | 13,220      |
| 1904 | 136,000  | 1924  | 4,800       |
| 1905 | 148,500  | 1925  | 10,663      |
| 1906 | 497,090  | 1926  | 9,049       |
| 1907 | 232,642  | 1927  | 7,035       |
| 1908 | 208,950  | 1928  | 22,200      |
| 1909 | 193,700  | 1929  | 26,850      |
| 1910 | 237,475  | 1930  | 3,540       |
| 1911 | 51,824   | 1931  | 5,607       |
| 1912 | 23,050   | 1932  | 4,961       |
| 1913 | 13,740   | 1933  | 690         |
| 1914 | 3,970    | 1934  | 2,456       |
| 1915 | 3,565    | 1935  | 945         |
| 1916 | 4,752    | 1936  | 2,878       |
| 1917 | 3,049    | 1937  | 2,075       |
| 1918 | 650      |       |             |
| 1919 | 5,425    | Total | \$2,262,773 |

**GRAPHITE**

*Bibliography:* State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.), XXX, XXXIII. Bulletins 67, 91. U. S. G. S., Min. Res., 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County.

During 1937 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item in order not to reveal the output of the single operator.

**Graphite Production of California, by Years.**

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

| Year | Pounds   | Value   | Year   | Pounds    | Value    |
|------|----------|---------|--------|-----------|----------|
| 1901 | 128,000  | \$4,480 | 1923   |           |          |
| 1902 | 84,000   | 1,680   | 1925   |           |          |
| 1903 |          |         | 1926   |           |          |
| 1913 | 2,500    | 25      | 1927   |           |          |
| 1914 |          |         | 1928   |           |          |
| 1915 |          |         | 1931   |           |          |
| 1916 | 29,190   | 2,335   | 1932   |           |          |
| 1917 |          |         | 1933   |           |          |
| 1918 |          |         | 1934   |           |          |
| 1919 | *770,000 | 37,225  | 1935   |           |          |
| 1920 |          |         | 1936   |           |          |
| 1921 |          |         | Totals |           |          |
| 1922 | *624,000 | 26,160  |        | 1,869,690 | \$86,975 |

\* Annual details concealed under 'Unapportioned,' on account of a single producer.

**GYPSUM**

*Bibliography:* State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI, XXXIII. Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During 1937 there were shipments of gypsum in California amounting to 186,160 tons valued at \$384,431. This came from three properties in Fresno County, and one each in Imperial and Riverside counties. Shipments showed an increase in both amount and value over the 1936 output which was 143,549 tons worth \$282,703.

**Total Production of Gypsum in California.**

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

| Year | Tons   | Value    | Year   | Tons      | Value       |
|------|--------|----------|--------|-----------|-------------|
| 1887 | 2,700  | \$27,000 | 1913   | 47,100    | \$135,050   |
| 1888 | 2,500  | 25,000   | 1914   | 29,734    | 78,375      |
| 1889 | 3,000  | 30,000   | 1915   | 20,200    | 48,953      |
| 1890 | 3,000  | 30,000   | 1916   | 33,384    | 59,533      |
| 1891 | 2,000  | 20,000   | 1917   | 30,825    | 56,840      |
| 1892 | 2,000  | 20,000   | 1918   | 19,695    | 37,176      |
| 1893 | 1,620  | 14,280   | 1919   | 19,813    | 50,579      |
| 1894 | 2,446  | 24,554   | 1920   | 20,507    | 92,535      |
| 1895 | 5,158  | 51,014   | 1921   | 37,412    | 78,875      |
| 1896 | 1,310  | 12,580   | 1922   | 47,084    | 188,336     |
| 1897 | 2,200  | 19,250   | 1923   | 86,410    | 289,136     |
| 1898 | 3,100  | 23,600   | 1924   | 25,569    | 53,210      |
| 1899 | 3,663  | 14,950   | 1925   | 107,613   | 172,444     |
| 1900 | 2,522  | 10,088   | 1926   | 114,868   | 211,337     |
| 1901 | 3,875  | 38,750   | 1927   | 94,630    | 292,090     |
| 1902 | 10,200 | 53,500   | 1928   | 104,700   | 200,567     |
| 1903 | 6,914  | 46,441   | 1929   | 140,844   | 396,951     |
| 1904 | 8,350  | 56,592   | 1930   | 116,865   | 243,507     |
| 1905 | 12,859 | 54,500   | 1931   | 88,354    | 199,198     |
| 1906 | 21,000 | 69,000   | 1932   | 46,867    | 93,818      |
| 1907 | 8,900  | 57,700   | 1933   | 59,235    | 120,451     |
| 1908 | 34,600 | 155,400  | 1934   | 58,149    | 113,606     |
| 1909 | 30,700 | 138,176  | 1935   | 70,533    | 151,807     |
| 1910 | 45,294 | 129,152  | 1936   | 143,549   | 282,703     |
| 1911 | 31,457 | 101,475  | 1937   | 186,160   | 384,431     |
| 1912 | 37,529 | 117,388  | Totals | 2,039,376 | \$5,371,928 |

### LIMESTONE

*Bibliography:* State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.), XXXIII. Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was produced by 22 properties in nine counties in California during 1937 to the amount of 351,755 short tons valued at \$830,562, this being an increase in amount and value over the 1936 output, which was 295,792 tons worth \$661,757. The 1937 yield came from four properties each in El Dorado, San Bernardino, and Santa Clara counties; three each in Santa Cruz and Tuolumne counties; and one each in Fresno, Los Angeles, San Luis Obispo, and San Mateo counties.

The amount here given does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as a smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno County was marl; and that from Alameda, San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1937 approximately 76,551 tons valued at \$277,430 was used for agricultural purposes and poultry grits.

Distribution of the 1937 output of limestone was as follows:

| County   | Tons           | Value            |
|--|----------------|------------------|
| El Dorado  | 227,721        | \$448,130        |
| San Bernardino   | 25,967         | 76,850           |
| Santa Clara <sup>b</sup>   | 39,379         | 74,041           |
| Santa Cruz   | 13,043         | 45,754           |
| Fresno, <sup>a</sup> Los Angeles, San Luis Obispo, San Mateo, <sup>b</sup> and Tuolumne* | 45,645         | 185,787          |
| <b>Totals...</b>   | <b>351,755</b> | <b>\$830,562</b> |

\* Combined to conceal the output of individual operators in each.

<sup>a</sup> Includes marl.

<sup>b</sup> Includes shells.

#### Limestone Production of California, by Years.

The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and

sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

| Year | Tons    | Value    | Year   | Tons      | Value        |
|------|---------|----------|--------|-----------|--------------|
| 1894 | 15,420  | \$19,275 | 1917   | 237,279   | \$356,396    |
| 1895 | 71,355  | 71,690   | 1918   | 208,566   | 456,258      |
| 1896 | 68,184  | 71,112   | 1919   | 88,291    | 248,145      |
| 1897 | 36,796  | 38,556   | 1920   | 90,120    | 298,197      |
| 1898 | 27,686  | 24,548   | 1921   | 75,921    | 305,912      |
| 1899 | 30,769  | 29,185   | 1922   | 84,382    | 282,181      |
| 1900 | 32,791  | 31,532   | 1923   | 143,266   | 348,464      |
| 1901 | 76,937  | 99,445   | 1924   | 219,476   | 582,660      |
| 1902 | 71,422  | 90,524   | 1925   | 319,977   | 494,525      |
| 1903 | 125,919 | 163,988  | 1926   | 108,795   | 367,501      |
| 1904 | 40,207  | 87,207   | 1927   | 699,790   | 663,957      |
| 1905 | 192,749 | 323,325  | 1928   | 127,895   | 397,935      |
| 1906 | 80,262  | 162,827  | 1929   | 168,315   | 557,617      |
| 1907 | 230,985 | 406,041  | 1930   | 169,477   | 508,751      |
| 1908 | 273,890 | 297,264  | 1931   | 177,268   | 560,699      |
| 1909 | 337,676 | 419,921  | 1932   | 168,950   | 487,788      |
| 1910 | 684,635 | 581,208  | 1933   | 207,371   | 487,712      |
| 1911 | 516,398 | 452,790  | 1934   | 198,057   | 461,139      |
| 1912 | 613,375 | 570,248  | 1935   | 227,214   | 496,054      |
| 1913 | 301,918 | 274,455  | 1936   | 295,792   | 661,757      |
| 1914 | 572,272 | 517,713  | 1937   | 351,755   | 830,562      |
| 1915 | 146,324 | 156,288  |        |           |              |
| 1916 | 187,521 | 217,733  | Totals | 9,102,448 | \$14,950,085 |

## LITHIA

*Bibliography:* State Mineralogist Reports II, IV, XIV, XXI, XXX. Bulletins 38, 67, 91.

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1937 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia mica total production in the State has been as follows:

| Year | Tons  | Value   | Year   | Tons   | Value     |
|------|-------|---------|--------|--------|-----------|
| 1899 | 124   | \$4,600 | 1920   | 10,046 | \$153,502 |
| 1900 | 440   | 11,000  | 1921   |        |           |
| 1901 | 1,100 | 27,500  | 1922   | *1,365 | 20,781    |
| 1902 | 822   | 31,880  | 1923   |        |           |
| 1903 | 700   | 27,300  | 1924   | 109    | 2,269     |
| 1904 | 641   | 25,000  | 1925   |        |           |
| 1905 | 25    | 276     | 1926   |        |           |
| 1906 |       |         | 1927   | *550   | 13,900    |
| 1915 | 91    | 1,365   | 1928   |        |           |
| 1916 | 71    | 1,065   | 1929   |        |           |
| 1917 | 880   | 8,800   |        |        |           |
| 1918 | 4,111 | 73,998  | Totals | 21,875 | \$417,636 |
| 1919 | 800   | 14,400  |        |        |           |

\* Annual details concealed under 'Unapportioned.'

## MICA

*Bibliography:* State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX, XXXIII. Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California with the exception of 1934. The 1937 output of mica came from a single property each in Imperial and Mariposa counties, while that for 1936 came from a single property in Imperial, Kern, and Riverside counties. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the individual operator. The material mined during the year was sericite. Sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. A small amount of vermiculite, a hydrous mica, expanded by heating and then used as an insulating agent, was mined in 1936.

Production of mica in California has been as follows:

| Year        | Tons  | Value   | Year        | Tons  | Value    |
|-------------|-------|---------|-------------|-------|----------|
| 1902        | 50    | \$2,500 | 1932}*----- |       |          |
| 1903        | 50    | 3,800   | 1933}*----- | 1,957 | 13,963   |
| 1904        | 50    | 3,000   | 1934-----   |       |          |
| 1929        |       |         | 1935}*----- |       |          |
| 1930}*----- | 2,240 | 15,260  | 1936}*----- | 3,833 | 15,650   |
| 1931        |       |         | 1937-----   | *     | *        |
|             |       |         | Totals----- | 8,180 | \$54,173 |

\* Annual details concealed under 'Unapportioned.'

## MINERAL PAINT

*Bibliography:* State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.). Bulletins 38, 91.

During 1937 there was a small amount of mineral paint produced in California, which came from a single property each in Nevada, Placer and Yuba counties. The details are concealed under 'Unapportioned' so as not to reveal individual output. The material from Nevada and Yuba counties was a limonite and that from Placer County a sienna.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity and Yuba counties, in which they are found.

## Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

| Year | Tons  | Value  | Year   | Tons   | Value     |
|------|-------|--------|--------|--------|-----------|
| 1890 | 40    | \$480  | 1914   | 132    | \$847     |
| 1891 | 22    | 880    | 1915   | 311    | 1,756     |
| 1892 | 25    | 750    | 1916   | 643    | 3,960     |
| 1893 | 590   | 26,795 | 1917   | 520    | 2,700     |
| 1894 | 610   | 14,140 | 1918   | 728    | 4,738     |
| 1895 | 750   | 8,425  | 1919   | 1,780  | 17,055    |
| 1896 | 395   | 5,540  | 1920   | 779    | 8,477     |
| 1897 | 578   | 8,165  | 1921   | 446    | 4,748     |
| 1898 | 653   | 9,698  | 1922   | 1,620  | 13,277    |
| 1899 | 1,704 | 20,294 | 1923   | 1,049  | 11,773    |
| 1900 | 529   | 3,903  | 1924   | 532    | 5,234     |
| 1901 | 325   | 875    | 1925   | 669    | 6,969     |
| 1902 | 589   | 1,533  | 1926   | 569    | 5,846     |
| 1903 | 2,370 | 3,720  | 1927*  | 919    | 9,592     |
| 1904 | 270   | 1,985  | 1928   |        |           |
| 1905 | 754   | 4,025  | 1929   | 467    | 2,820     |
| 1906 | 250   | 1,720  | 1930*  |        |           |
| 1907 | 250   | 1,720  | 1931*  | 250    | 3,000     |
| 1908 | 335   | 2,250  | 1932   |        |           |
| 1909 | 305   | 2,325  | 1933   |        |           |
| 1910 | 200   | 2,040  | 1935*  | 570    | 5,550     |
| 1911 | 186   | 1,184  | 1936   |        |           |
| 1912 | 300   | 1,800  | 1937   | *      | *         |
| 1913 | 303   | 1,780  | Totals | 23,717 | \$227,648 |

\* Annual details concealed under 'Unapportioned.'

### MINERAL WATER

*Bibliography:* State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXIII (inc.). U. S. G. S., Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial production of mineral water during 1937 amounted to 18,309,729 gallons valued at \$1,130,810, as compared with 19,348,513 gallons valued at \$777,899 in 1936. The 1937 output came from springs on 38 properties in 17 counties, and was distributed as follows:

| County   | Gallons    | Value       |
|--|------------|-------------|
| Lake   | 38,489     | \$33,858    |
| Los Angeles  | 8,615,029  | 750,512     |
| Napa   | 77,531     | 15,683      |
| Sonoma   | 70,788     | 6,838       |
| Butte, Calaveras, Colusa, Contra Costa, El Dorado, Marin, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Siskiyou* | 9,507,892  | 323,919     |
| Totals   | 18,309,729 | \$1,130,810 |

\* Combined to conceal the output of operators in each.

The production above tabulated came either from springs or artesian wells, and was bottled, in part with artificial carbonation, but

mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.



Steam Wells at The Geysers Hot Springs, Sonoma County.

Photo by Walter W. Bradley

#### Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,<sup>1</sup> and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

| Year | Gallons   | Value     | Year   | Gallons     | Value        |
|------|-----------|-----------|--------|-------------|--------------|
| 1887 | 618,162   | \$144,368 | 1913   | 2,350,792   | \$599,748    |
| 1888 | 1,112,202 | 252,990   | 1914   | 2,443,572   | 476,169      |
| 1889 | 808,625   | 252,241   | 1915   | 2,274,267   | 467,738      |
| 1890 | 258,722   | 89,786    | 1916   | 2,273,817   | 410,112      |
| 1891 | 334,553   | 139,959   | 1917   | 1,942,020   | 340,566      |
| 1892 | 331,875   | 162,019   | 1918   | 1,808,791   | 375,650      |
| 1893 | 383,179   | 90,667    | 1919   | 2,233,842   | 340,117      |
| 1894 | 402,275   | 184,481   | 1920   | 2,391,791   | 421,643      |
| 1895 | 701,397   | 291,500   | 1921   | 3,446,278   | 367,476      |
| 1896 | 808,843   | 337,434   | 1922   | 4,276,346   | 486,424      |
| 1897 | 1,508,192 | 345,863   | 1923   | 5,487,276   | 616,919      |
| 1898 | 1,429,309 | 213,817   | 1924   | 8,159,211   | 818,726      |
| 1899 | 1,338,537 | 406,891   | 1925   | 12,115,072  | 1,230,455    |
| 1900 | 2,456,115 | 268,607   | 1926   | 14,074,877  | 1,171,550    |
| 1901 | 1,555,328 | 559,057   | 1927   | 16,644,423  | 1,487,183    |
| 1902 | 1,701,142 | 612,477   | 1928   | 25,049,002  | 1,304,969    |
| 1903 | 2,056,340 | 558,201   | 1929   | 27,032,083  | 2,040,615    |
| 1904 | 2,430,320 | 496,946   | 1930   | 37,354,111  | 2,870,663    |
| 1905 | 2,194,150 | 538,700   | 1931   | 26,164,331  | 1,347,860    |
| 1906 | 1,585,690 | 478,186   | 1932   | 19,031,224  | 1,495,988    |
| 1907 | 2,924,260 | 544,016   | 1933   | 15,650,406  | 719,746      |
| 1908 | 2,789,715 | 560,507   | 1934   | 19,882,436  | 1,071,197    |
| 1909 | 2,449,834 | 465,488   | 1935   | 16,659,254  | 940,333      |
| 1910 | 2,335,250 | 522,009   | 1936   | 19,348,513  | 777,899      |
| 1911 | 2,637,669 | 590,654   | 1937   | 18,309,729  | 1,130,810    |
| 1912 | 2,497,794 | 529,384   | Totals | 346,053,460 | \$33,036,603 |

<sup>1</sup> Cronise, T. F., *The natural wealth of California*, p. 182, 1868.

## PHOSPHATES

*Bibliography:* State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite,  $Li(AlF)PO_4$ , have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia.

## PUMICE and VOLCANIC ASH

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXVIII (inc.), XXX-XXXII (inc.). Bulletin 38. U. S. Bureau of Mines I. G. 6560. (See 'Tufa'.)

The production of pumice and volcanic ash in California during the year 1937 amounted to 10,392 short tons, valued at \$79,005. This came from five properties in Siskiyou County, four in Inyo County, two each in Madera and Napa counties; and one each in Imperial, Kern, Mariposa, Mono, and San Luis Obispo counties. The 1937 figures showed a decrease in amount and value as compared with those of 1936 which were 17,132 tons worth \$143,709.

The material from three deposits in Inyo County, part from Madera, and that from Imperial, Mariposa, Mono, Napa, and Siskiyou counties, was 6,387 tons of lump pumice, which was used in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes, and for chicken-house litter. The production part of one property in Madera County, one property in Inyo, and that in Kern and San Luis Obispo counties was 4,005 tons of volcanic ash, or tuff variety, and was employed in making soap, cleanser compounds, as a concrete filler in cement displacement, in asphalt, and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

## Pumice Production of California, by Years.

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

| Year | Tons  | Value  | Year   | Tons    | Value       |
|------|-------|--------|--------|---------|-------------|
| 1909 | 50    | \$500  | 1924   | 4,919   | \$33,404    |
| 1910 |       |        | 1925   | 5,319   | 32,937      |
| 1911 |       |        | 1926   | 7,170   | 48,350      |
| 1912 | 100   | 2,500  | 1927   | 13,779  | 168,896     |
| 1913 | 3,590 | 4,500  | 1928   | 10,440  | 105,055     |
| 1914 | 50    | 1,000  | 1929   | 10,449  | 76,123      |
| 1915 | 380   | 6,400  | 1930   | 12,947  | 128,847     |
| 1916 | 1,246 | 18,092 | 1931   | 11,711  | 108,130     |
| 1917 | 525   | 5,295  | 1932   | 9,891   | 86,034      |
| 1918 | 2,114 | 28,669 | 1933   | 8,243   | 61,067      |
| 1919 | 2,388 | 43,657 | 1934   | 9,951   | 54,748      |
| 1920 | 1,537 | 25,590 | 1935   | 14,890  | 87,055      |
| 1921 | 406   | 6,310  | 1936   | 17,132  | 143,709     |
| 1922 | 613   | 4,248  | 1937   | 10,392  | 79,005      |
| 1923 | 2,936 | 16,309 | Totals | 153,168 | \$1,376,730 |

### PYRITES

*Bibliography:* State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1937 came from a single property in Shasta County. The 1937 production showed a decrease in both quantity and value from that of 1936. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

#### Pyrites Production in California, by Years.

The total recorded pyrites production in California to date is as follows:

| Year | Tons    | Value     | Year   | Tons      | Value        |
|------|---------|-----------|--------|-----------|--------------|
| 1898 | 6,000   | \$30,000  | 1919   | 147,024   | \$540,300    |
| 1899 | 5,400   | 28,620    | 1920   | 146,001   | 530,581      |
| 1900 | 3,642   | 21,133    | 1921   | 110,025   | 473,735      |
| 1901 | 4,578   | 18,429    | 1922   | 151,381   | 570,425      |
| 1902 | 17,525  | 60,306    | 1923   | 148,004   | 555,308      |
| 1903 | 24,311  | 94,000    | 1924   | 124,214   | 517,835      |
| 1904 | 15,043  | 62,992    | 1925   | 129,500   | 528,650      |
| 1905 | 15,503  | 63,958    | 1926   | 100,896   | 466,088      |
| 1906 | 46,689  | 145,895   | 1927   | 130,910   | 564,823      |
| 1907 | 82,270  | 251,774   | 1928   | 90,566    | 400,627      |
| 1908 | 107,081 | 610,335   | 1929   | 79,169    | 363,717      |
| 1909 | 457,867 | 1,389,802 | 1930   | 39,058    | 194,228      |
| 1910 | 42,621  | 179,862   | 1931   | 25,402    | 131,174      |
| 1911 | 54,225  | 182,954   | 1932   |           |              |
| 1912 | 69,872  | 203,470   | 1933*  | 72,271    | 297,832      |
| 1913 | 79,000  | 218,537   | 1934   |           |              |
| 1914 | 79,267  | 230,058   | 1935*  | 157,129   | 547,754      |
| 1915 | 92,462  | 293,148   | 1936   |           |              |
| 1916 | 120,525 | 372,969   | 1937*  | 155,107   | 541,915      |
| 1917 | 111,325 | 323,704   |        |           |              |
| 1918 | 128,329 | 425,012   | Totals | 3,370,092 | \$12,431,900 |

\* Annual details concealed under 'Unapportioned.'

### SHALE OIL

*Bibliography:* State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210, Eng. and Min. Jour. Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb., 1925. Min. Congress Jour., Dec., 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flota-

tion oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

Shale Oil Production of California, by Years

| Year        | Barrels | Value     |
|-------------|---------|-----------|
| 1922)*      | 4,333   | \$44,262  |
| 1923)       | 8,688   | 55,240    |
| 1924)*      | 8,819   | 9,998     |
| 1925)       |         |           |
| 1926)       |         |           |
| 1927)*      |         |           |
| 1928)       |         |           |
| Totals..... | 21,840  | \$109,500 |

\* Annual details concealed under 'Unapportioned.'

SILICA (Sand and Quartz)

*Bibliography:* State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI-XXXIII (inc.). Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1937 amounted to 84,313 short tons valued at \$348,987 f.o.b. rail shipping point, and came from two properties in Contra Costa County and one each in Monterey, Riverside, and San Diego counties. The above was an increase in both amount and value over the output of 1936 which was 77,830 tons worth \$310,278. The 1937 output consisted of 83,567 tons of glass sand and 746 tons of vein or boulder quartz.

The glass sand came from Contra Costa, Monterey and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County are replacing the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class color-

less glass; for such, it must be essentially iron-free. Even a fractional per cent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of \$2 per ton.

#### Total Silica Production in California.

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

| Year | Tons   | Value   | Year   | Tons    | Value       |
|------|--------|---------|--------|---------|-------------|
| 1899 | 3,000  | \$3,500 | 1919   | 18,659  | \$101,600   |
| 1900 | 2,200  | 2,200   | 1920   | 25,324  | 96,793      |
| 1901 | 5,000  | 16,250  | 1921   | 10,569  | 49,179      |
| 1902 | 4,500  | 12,225  | 1922   | 9,874   | 31,016      |
| 1903 | 7,725  | 7,525   | 1923   | 7,964   | 30,420      |
| 1904 | 10,004 | 12,276  | 1924   | 6,808   | 35,006      |
| 1905 | 9,257  | 8,121   | 1925   | 12,498  | 96,780      |
| 1906 | 9,750  | 13,375  | 1926   | 30,010  | 104,317     |
| 1907 | 11,065 | 8,178   | 1927   | 24,636  | 94,762      |
| 1908 | 9,255  | 22,045  | 1928   | 14,814  | 66,679      |
| 1909 | 12,259 | 25,517  | 1929   | 18,686  | 79,210      |
| 1910 | 19,224 | 18,265  | 1930   | 17,802  | 71,380      |
| 1911 | 8,620  | 8,672   | 1931   | 43,330  | 182,769     |
| 1912 | 13,075 | 15,404  | 1932   | 33,997  | 136,324     |
| 1913 | 18,618 | 21,899  | 1933   | 70,329  | 266,520     |
| 1914 | 28,538 | 22,688  | 1934   | 70,432  | 206,643     |
| 1915 | 28,904 | 34,322  | 1935   | 70,835  | 297,272     |
| 1916 | 20,880 | 48,908  | 1936   | 77,830  | 310,278     |
| 1917 | 19,376 | 41,166  | 1937   | 84,313  | 348,987     |
| 1918 | 23,257 | 88,930  | Totals | 913,217 | \$3,116,401 |

#### SILLIMANITE-ANDALUSITE-KYANITE GROUP

*Bibliography:* State Mineralogist Reports XX, XXIII, XXIV, XXVII. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press. Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates ( $Al_2SiO_5$ ), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Kyanite is also an aluminum silicate ( $Al_2SiO_5$ ), of the same chemical composition as andalusite and sillimanite, but crystallizing in the trielinic system. A deposit of kyanite is being mined in Imperial

County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though different somewhat in composition from the above, being a basic aluminum silicate ( $\text{HAl}_8\text{BSi}_3\text{O}_{20}$ ), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

**Total Sillimanite Group Production of California, by Years**

| Year  | Tons  | Value    | Year   | Tons   | Value     |
|-------|-------|----------|--------|--------|-----------|
| 1922  |       |          | 1931   |        |           |
| 1923* | 4,584 | \$98,790 | 1932*  | 1,244  | \$21,800  |
| 1924  |       |          | 1933   |        |           |
| 1925  |       |          | 1934*  | 3,035  | 69,026    |
| 1926* | 4,810 | 203,000  | 1935   |        |           |
| 1927  |       |          | 1936*  | 3,112  | 89,214    |
| 1928* | 4,276 | 76,000   | 1937   |        | *         |
| 1929  |       |          | Totals | 25,420 | \$756,723 |
| 1930* | 4,359 | 198,893  |        |        |           |

\* Annual details concealed under 'Unapportioned.'

**SOAPSTONE and TALC**

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX, XXXIII. Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1937 amounted to 29,657 short tons valued at \$347,772. This was an increase in both quantity and value over the 1936 figures, which were 25,643 tons valued at \$309,287. Of the 1937 production, 28,202 tons were high-grade talc from Inyo and San Bernardino counties, which material was utilized mainly in toilet powders, paint, paper, for rubber manufacture, and some in ceramics. The remainder of 1,455 tons was soapstone and came from Butte, El Dorado, and Los Angeles counties.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper and part also in magnesite cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from Vermont and New York and of massive soapstone from Virginia.

During 1937 imports of talc, steatite, etc., totaled 26,876 short tons valued at \$472,819, as compared with 24,520 tons worth \$456,667 during 1936, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on talc, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

**Talc Production of California, by Years.**

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

| Year | Tons  | Value    | Year   | Tons    | Value       |
|------|-------|----------|--------|---------|-------------|
| 1893 | 400   | \$17,750 | 1916   | 1,703   | \$9,831     |
| 1894 |       |          | 1917   | 5,267   | 45,279      |
| 1895 | 25    | 375      | 1918   | 11,760  | 85,534      |
| 1896 |       |          | 1919   | 8,764   | 115,091     |
| 1897 |       |          | 1920   | 11,327  | 221,362     |
| 1898 |       |          | 1921   | 8,752   | 130,078     |
| 1899 |       |          | 1922   | 13,378  | 197,186     |
| 1900 |       |          | 1923   | 17,439  | 252,661     |
| 1901 | 10    | 119      | 1924   | 16,179  | 242,770     |
| 1902 | 14    | 288      | 1925   | 15,465  | 239,084     |
| 1903 | 219   | 10,124   | 1926   | 17,004  | 255,645     |
| 1904 | 228   | 2,315    | 1927   | 16,218  | 164,744     |
| 1905 | 300   | 3,000    | 1928   | 18,668  | 251,372     |
| 1906 |       |          | 1929   | 18,676  | 193,493     |
| 1907 |       |          | 1930   | 15,861  | 154,258     |
| 1908 | 3     | 48       | 1931   | 13,472  | 109,940     |
| 1909 | 33    | 280      | 1932   | 10,690  | 122,880     |
| 1910 | 740   | 7,260    | 1933   | 14,451  | 153,668     |
| 1911 |       |          | 1934   | 13,920  | 158,606     |
| 1912 | 1,750 | 7,350    | 1935   | 17,332  | 170,830     |
| 1913 | 1,350 | 6,150    | 1936   | 25,643  | 309,287     |
| 1914 | 1,000 | 4,500    | 1937   | 29,657  | 347,772     |
| 1915 | 1,663 | 14,750   | Totals | 329,361 | \$4,104,680 |

**STRONTIUM**

*Bibliography:* State Mineralogist Report XXVI, XXVII, Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

There has been no production of strontium minerals in California since 1918, though in that year both celestite ( $\text{SrSO}_4$ ), and the carbonate, strontianite ( $\text{SrCO}_3$ ) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averaging 80%  $\text{SrCO}_3$  have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

Production of strontium minerals in California, by years, has been as follows:

| Year | Tons  | Value   | Year   | Tons  | Value    |
|------|-------|---------|--------|-------|----------|
| 1916 | 57    | \$2,850 | 1919   |       |          |
| 1917 | 3,050 | 37,000  |        |       |          |
| 1918 | 2,900 | 33,000  | Totals | 6,007 | \$72,850 |

**SULPHUR**

*Bibliography:* State Mineralogist Reports IV, XIII, XIV, XXV. Bulletins 38, 67, 91.

During 1937 there were two producers of sulphur in California, the material coming from Inyo County. The annual details are con-

cealed in the 'Unapportioned' item so as not to reveal the output of either operator. For the two years, 1935-1936, the production totaled 5,308 short tons valued at \$61,603. The 1937 output of sulphur was an increase over that of 1936 in amount and value.

The 1929-1931 output, which came from Colusa County, was utilized in the manufacture of a fertilizer and for dusting for mildew. The last previous production was in 1923 and 1924 and came from Kern County. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

#### Total Production of Sulphur in California.

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

| Year         | Tons | Value    | Year   | Tons   | Value     |
|--------------|------|----------|--------|--------|-----------|
| 1865         |      |          | 1932   |        |           |
| 1866*        | 941  | \$53,500 | 1933   | 1,991  | \$32,838  |
| 1867         |      |          | 1934   | 4,412  | 67,656    |
| 1868 to 1922 |      |          | 1935*  | 5,308  | 61,603    |
| 1923*        | 185  | 4,071    | 1936   | *      | *         |
| 1924         |      |          | 1937   |        |           |
| 1925 to 1928 |      |          | Totals | 13,102 | \$228,693 |
| 1929         |      |          |        |        |           |
| 1930*        | 265  | 9,025    |        |        |           |
| 1931         |      |          |        |        |           |

\* Annual details concealed under 'Unapportioned.'

## CHAPTER SIX

### SALINES

*Bibliography:* State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.), XXXIII. Bulletin 24. Spurr and Wormser, "Marketing of Minerals," "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromine, and in 1931 by iodine. The nitrates are still prospective.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from \$12,416,349 in 1936 to \$13,216,270 in 1937. The following table gives details for each year:

| Substance            | 1936         |              | 1937         |              | Increase +<br>Decrease -<br>Value |
|----------------------|--------------|--------------|--------------|--------------|-----------------------------------|
|                      | Amount       | Value        | Amount       | Value        |                                   |
| Borates.....         | 313,389 tons | \$5,911,093  | 326,099 tons | \$6,206,619  | \$295,526+                        |
| Magnesium salts..... | 3,798 tons   | 347,838      | 3,867 tons   | 316,669      | 31,169-                           |
| Salt.....            | 398,249 tons | 1,227,505    | 370,431 tons | 1,043,611    | 183,180-                          |
| Soda.....            | 144,314 tons | 1,412,788    | 153,685 tons | 1,461,057    | 48,269+                           |
| Unapportioned.....   |              | 3,517,125    |              | 4,187,600    | 670,475+                          |
| Total values.....    |              | \$12,416,349 |              | \$13,216,270 |                                   |
| Net increase.....    |              |              |              |              | \$799,921                         |

<sup>a</sup> Includes bromine, calcium chloride, iodine and potash.

### BORATES

*Bibliography:* State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIX (inc.), XXV-XXVII (inc.), XXXIII. Bulletins 24, 67, 91.

During 1937 there was produced in California a total of 346,587 tons of borate materials compared with 319,658 tons for the year 1936. The material shipped during the year included the new sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely calcined before shipping to the refinery for conversion into the borax of commerce, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent, A. B. A. This is approximately the average A. B. A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1937 production totaled 326,099 tons valued at \$6,206,619. This was an increase both in quantity and value over the 1936 output, which was 313,389 tons worth \$5,911,093. The

total amount of borates exported from the United States<sup>1</sup> during the year 1937 was 153,772 tons valued at \$4,708,691, as compared with 102,021 tons worth \$3,119,850 in 1936.

**Total Production of Borate Materials in California.**

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer. California is also the premier world source, today.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate, near Kramer in Kern County. The brines of Searles Lake are also an important source.

The total production of borate materials in California is shown in the following table:

**Total Production of Borate Materials in California**

| Year | Tons   | Value     | Year   | Tons      | Value        |
|------|--------|-----------|--------|-----------|--------------|
| 1864 | 12     | \$9,478   | 1902   | 17,202    | \$2,234,994  |
| 1865 | 126    | 94,099    | 1903   | 34,430    | 661,400      |
| 1866 | 201    | 132,538   | 1904   | 45,647    | 698,810      |
| 1867 | 220    | 156,137   | 1905   | 46,334    | 1,019,158    |
| 1868 | 32     | 22,384    | 1906   | 58,173    | 1,152,410    |
| 1869 |        |           | 1907   | 53,413    | 1,200,913    |
| 1870 |        |           | 1908   | 22,200    | 1,117,000    |
| 1871 |        |           | 1909   | 16,628    | 1,163,960    |
| 1872 | 140    | 89,600    | 1910   | 16,828    | 1,177,960    |
| 1873 | 515    | 255,440   | 1911   | 50,945    | 1,456,672    |
| 1874 | 915    | 259,427   | 1912   | 42,135    | 1,122,713    |
| 1875 | 1,168  | 289,080   | 1913   | 58,051    | 1,491,530    |
| 1876 | 1,437  | 312,537   | 1914   | 62,500    | 1,483,500    |
| 1877 | 993    | 193,705   | 1915   | 67,004    | 1,663,521    |
| 1878 | 373    | 66,257    | 1916   | 103,523   | 2,409,375    |
| 1879 | 364    | 65,443    | 1917   | 109,944   | 2,561,958    |
| 1880 | 609    | 149,245   | 1918   | 88,772    | 1,867,905    |
| 1881 | 690    | 189,750   | 1919   | 66,791    | 1,717,192    |
| 1882 | 732    | 201,300   | 1920   | 127,065   | 2,794,206    |
| 1883 | 900    | 265,500   | 1921   | 50,136    | 1,096,326    |
| 1884 | 1,019  | 198,705   | 1922   | 39,087    | 1,068,025    |
| 1885 | 942    | 155,430   | 1923   | 62,667    | 1,893,798    |
| 1886 | 1,285  | 173,475   | 1924   | 52,070    | 1,599,149    |
| 1887 | 1,015  | 116,659   | 1925   | 46,124    | 1,526,938    |
| 1888 | 1,405  | 196,636   | 1926   | 47,605    | 1,625,298    |
| 1889 | 965    | 145,473   | 1927   | 72,462    | 3,043,260    |
| 1890 | 3,201  | 480,152   | 1928   | 109,722   | 3,378,552    |
| 1891 | 4,267  | 640,000   | 1929   | 144,678   | 3,312,085    |
| 1892 | 5,525  | 838,787   | 1930   | 209,869   | 3,636,817    |
| 1893 | 3,955  | 593,292   | 1931   | 206,405   | 5,753,037    |
| 1894 | 5,770  | 807,807   | 1932   | 179,356   | 2,856,470    |
| 1895 | 5,959  | 595,900   | 1933   | 197,495   | 3,019,513    |
| 1896 | 6,754  | 675,400   | 1934   | 240,606   | 5,524,262    |
| 1897 | 8,000  | 1,080,000 | 1935   | 280,249   | 4,602,064    |
| 1898 | 8,300  | 1,153,000 | 1936   | 313,389   | 5,911,093    |
| 1899 | 20,357 | 1,139,882 | 1937   | 326,099   | 6,206,619    |
| 1900 | 25,837 | 1,013,251 |        |           |              |
| 1901 | 22,221 | 982,380   | Totals | 3,801,898 | \$98,866,665 |

<sup>1</sup> Refined borax, <sup>2</sup> Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

<sup>1</sup> Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1937, Part 1.

### BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County. The 1937 output showed an increased value and amount as compared with 1936 production; annual details of which are concealed under the 'Unapportioned' item so as not to reveal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

| Year   | Tons | Value     | Year   | Tons  | Value       |
|--------|------|-----------|--------|-------|-------------|
| 1926   |      |           | 1932   |       |             |
| 1927,* | 158  | \$120,480 | 1933,* | 559   | \$146,547   |
| 1928   |      |           | 1934   |       |             |
| 1929   |      |           | 1935,* | 805   | 191,465     |
| 1930,* | 802  | 552,933   | 1936,* | *     | *           |
| 1931   |      |           | 1937   |       |             |
|        |      |           | Totals | 2,324 | \$1,011,425 |

\*Annual details concealed under 'Unapportioned.'

### CALCIUM CHLORIDE

*Bibliography:* U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hygroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1937 the production of calcium chloride in California came from two plants in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. The 1937 output showed an increase in both amount and value as compared with that of 1936.

#### Total Calcium Chloride Production in California.

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

| Year   | Tons   | Value    | Year   | Tons   | Value       |
|--------|--------|----------|--------|--------|-------------|
| 1921   | 683    | \$22,980 | 1930,* |        |             |
| 1922,* | 1,204  | 26,580   | 1931,* | 9,688  | \$103,237   |
| 1923,* |        |          | 1932,* |        |             |
| 1924,* | 10,988 | 328,876  | 1933,* | 3,103  | 15,500      |
| 1925,* |        |          | 1934,* |        |             |
| 1926,* | 34,195 | 508,748  | 1935,* | 4,048  | 16,196      |
| 1927,* |        |          | 1936,* |        |             |
| 1928,* | 12,020 | 114,080  | 1937   | 7,227  | 35,073      |
| 1929   |        |          | Totals | 83,156 | \$1,171,270 |

\*Annual details concealed under 'Unapportioned.'

## IODINE

*Bibliography:* U. S. Bureau of Mines I. C. 6387.

In 1936 the output of iodine in California came from two plants in Los Angeles County and showed an increase in both quantity and value over 1935. The annual details for 1936 are concealed under the 'Unapportioned' item to conceal the output of either operator. The combined 1935-1936 production came from three plants in Los Angeles County, and amounted to 487,401 pounds, valued at \$379,702.

**Total Iodine Production in California.**

Iodine as first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

| Year        | Pounds    | Value       |
|-------------|-----------|-------------|
| 1929*-----  | 696,297   | \$1,374,311 |
| 1931-----   | 355,279   | 423,016     |
| 1933-----   | 487,401   | 379,702     |
| 1934-----   | *         | *           |
| 1935*-----  |           |             |
| 1937-----   |           |             |
| Totals----- | 1,538,977 | \$2,177,029 |

\* Annual details concealed under 'Unapportioned.'

**MAGNESIUM SALTS**

*Bibliography:* State Mineralogist Reports XX, XXI, XXV-XXVI (inc.). Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1937 there was an output of magnesium salts in California coming from one plant in San Diego County, and two in San Mateo County. This amounted to 3,867 short tons valued at \$316,669, and consisted of the chloride and carbonate. The 1936 output amounted to 3,798 tons worth \$347,838, which was also the chloride and the carbonate. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, a bulky white powder, was used as a heat-insulating material, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate marketed in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitters from the salt plants and was in part marketed in the liquid form carrying from 35% to 67%  $MgCl_2$ , and in part as dry crystals, while that from San Mateo County was magnesium carbonate.

The average value reported for the chloride produced in California in 1937 was approximately \$29.69 per ton, f.o.b. plant.

#### Total Production of Magnesium Salts in California.

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

| Year   | Tons  | Value   | Year   | Tons   | Value       |
|--------|-------|---------|--------|--------|-------------|
| 1916   | 851   | \$6,407 | 1929]* |        |             |
| 1917   | 1,064 | 34,973  | 1930   | 4,914  | \$333,906   |
| 1918   | 1,008 | 29,955  | 1931]* | 2,749  | 217,979     |
| 1919   | 1,616 | 82,457  | 1932   |        |             |
| 1920   | 3,150 | 107,787 | 1933   | 2,073  | 159,660     |
| 1921   | 4,153 | 106,140 | 1934   | 2,325  | 194,642     |
| 1922   | 3,036 | 89,788  | 1935   | 2,785  | 235,531     |
| 1923   | 3,662 | 116,031 | 1936   | 3,798  | 347,838     |
| 1924   | 4,823 | 145,883 | 1937   | 3,867  | 316,669     |
| 1925   | 4,221 | 132,553 |        |        |             |
| 1926   | 4,881 | 124,470 | Total  | 61,217 | \$2,922,258 |
| 1927]* | 6,241 | 139,589 |        |        |             |
| 1928]* |       |         |        |        |             |

\* Annual details concealed under 'Unapportioned.'

#### NITRATES

*Bibliography:* State Mineralogist Reports XV, XXV, XXVI, XXVII. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydroelectric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the power. Sodium and potassium cyanides can be made by fixation of atmospheric nitrogen electrically.

#### POTASH

*Bibliography:* State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXVII (inc.). Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1937 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed

under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent K<sub>2</sub>O content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts in the United States during 1937 according to the U. S. Bureau of Foreign and Domestic Commerce amounted to 701,472 long tons, valued at \$16,794,981, compared with 422,956 long tons worth \$9,990,250 in 1936. These materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations have recently ranged from \$36.25 per ton c.i.f. Atlantic and Gulf ports for high grade sulphate (90%-95%), and \$16.50 for manure salts (30%).

#### Total Production of Potash in California.

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

| Year | Tons    | Value     | Year   | Tons      | Value        |
|------|---------|-----------|--------|-----------|--------------|
| 1914 | 10      | \$460     | 1927   | 67,340    | \$1,952,852  |
| 1915 | 1,076   | 19,391    | 1928*  | 178,680   | 5,522,350    |
| 1916 | 17,808  | 663,605   | 1929   |           |              |
| 1917 | 129,022 | 4,202,889 | 1930*  | 172,263   | 5,500,536    |
| 1918 | 49,381  | 6,808,976 | 1931   |           |              |
| 1919 | 28,118  | 2,415,963 | 1932*  | 153,147   | 3,932,721    |
| 1920 | 26,298  | 1,465,463 | 1933   |           |              |
| 1921 | 14,806  | 390,210   | 1934*  | 355,604   | 3,750,809    |
| 1922 | 17,776  | 584,388   | 1935   |           |              |
| 1923 | 29,597  | 709,836   | 1936*  | 358,417   | 6,988,922    |
| 1924 | 33,107  | 747,407   | 1937   |           |              |
| 1925 | 36,355  | 829,770   |        |           |              |
| 1926 | 32,884  | 812,285   | Totals | 1,600,789 | \$46,304,833 |

\* Annual details concealed under 'Unapportioned.'

#### SALT

*Bibliography:* State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.). Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County, and from a mineral spring in Butte County.

During 1937 there was an output in California of 370,431 tons of salt worth \$1,044,325, compared with 398,249 tons worth \$1,227,505

in 1936. There were twelve companies operating plants in 1937 two in San Bernardino County and one each in Alameda, Butte, Imperial, Kern, Los Angeles, Modoc, Monterey, Orange, San Diego, and San Mateo.

The average value reported for salt produced in California during 1937 was \$2.82 per ton f.o.b. plant, compared with \$3.08 in 1936; \$3.36 in 1935; \$3.68 in 1934; \$3.89 in 1933; and \$3.58 in 1932.

#### Production of Salt in California, by Years.

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

| Year | Tons    | Value     | Year   | Tons      | Value        |
|------|---------|-----------|--------|-----------|--------------|
| 1887 | 28,000  | \$112,000 | 1913   | 204,407   | \$462,681    |
| 1888 | 30,800  | 92,400    | 1914   | 223,806   | 583,553      |
| 1889 | 21,000  | 63,000    | 1915   | 169,028   | 368,737      |
| 1890 | 8,729   | 57,085    | 1916   | 186,148   | 455,695      |
| 1891 | 20,094  | 90,303    | 1917   | 227,825   | 584,373      |
| 1892 | 23,570  | 104,788   | 1918   | 212,076   | 806,328      |
| 1893 | 50,500  | 213,000   | 1919   | 233,994   | 896,963      |
| 1894 | 49,131  | 140,087   | 1920   | 230,638   | 972,648      |
| 1895 | 53,031  | 150,576   | 1921   | 197,989   | 832,702      |
| 1896 | 64,743  | 153,244   | 1922   | 223,238   | 819,187      |
| 1897 | 67,851  | 157,520   | 1923   | 275,979   | 1,130,670    |
| 1898 | 93,421  | 170,855   | 1924   | 318,800   | 1,159,137    |
| 1899 | 82,654  | 149,588   | 1925   | 284,068   | 949,826      |
| 1900 | 89,338  | 204,754   | 1926   | 311,761   | 1,124,978    |
| 1901 | 126,218 | 366,376   | 1927   | 263,028   | 639,127      |
| 1902 | 115,208 | 205,876   | 1928   | 340,580   | 1,024,656    |
| 1903 | 102,895 | 211,365   | 1929   | 392,039   | 2,665,436    |
| 1904 | 95,968  | 187,300   | 1930   | 347,945   | 1,167,487    |
| 1905 | 77,118  | 141,925   | 1931   | 330,951   | 1,233,567    |
| 1906 | 101,650 | 213,228   | 1932   | 256,353   | 918,480      |
| 1907 | 88,063  | 310,967   | 1933   | 321,312   | 1,251,024    |
| 1908 | 121,764 | 281,469   | 1934   | 332,194   | 1,222,810    |
| 1909 | 155,680 | 414,708   | 1935   | 365,711   | 1,230,480    |
| 1910 | 174,920 | 395,417   | 1936   | 398,249   | 1,227,505    |
| 1911 | 173,332 | 324,255   | 1937   | 370,431   | 1,044,325    |
| 1912 | 185,721 | 383,370   | Totals | 9,218,949 | \$30,067,831 |

#### SODA

*Bibliography:* State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.). Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1936 included: Soda ash, trona, caustic soda, and bicarbonate from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona ('sesqui-carbonate,' a double salt of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$ ) from Searles Lake, San Bernardino County. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County.

The output for 1937 amounted to 153,865 tons valued at \$1,461,057, as compared with 144,314 tons worth \$1,412,788 in 1936.

The dense ash and bicarbonate were used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes.

## Soda Production of California, by Years.

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

| Year | Tons   | Value    | Year   | Tons      | Value        |
|------|--------|----------|--------|-----------|--------------|
| 1894 | 1,530  | \$20,000 | 1917   | 24,505    | \$928,578    |
| 1895 | 1,900  | 47,500   | 1918   | 20,447    | 855,423      |
| 1896 | 3,000  | 65,000   | 1919   | 21,294    | 721,958      |
| 1897 | 5,000  | 110,000  | 1920   | 32,407    | 1,164,898    |
| 1898 | 7,000  | 154,000  | 1921   | 14,828    | 438,996      |
| 1899 | 10,000 | 250,000  | 1922   | 20,084    | 573,661      |
| 1900 | 1,000  | 50,000   | 1923   | 34,885    | 764,284      |
| 1901 | 8,000  | 400,000  | 1924   | 32,536    | 711,796      |
| 1902 | 7,000  | 50,000   | 1925   | 48,625    | 947,649      |
| 1903 | 18,000 | 27,000   | 1926   | 63,333    | 1,305,802    |
| 1904 | 12,000 | 18,000   | 1927   | 62,571    | 1,478,239    |
| 1905 | 15,000 | 22,500   | 1928   | 80,838    | 1,469,297    |
| 1906 | 12,000 | 18,000   | 1929   | 90,646    | 1,838,657    |
| 1907 |        |          | 1930   | 90,122    | 1,627,344    |
| 1908 | 9,600  | 14,400   | 1931   | 78,701    | 1,217,811    |
| 1909 | 7,712  | 11,593   | 1932   | 58,017    | 826,369      |
| 1910 | 8,125  | 11,862   | 1933   | 70,598    | 1,019,130    |
| 1911 | 9,023  | 52,887   | 1934   | 99,380    | 1,219,561    |
| 1912 | 7,200  | 37,094   | 1935   | 125,504   | 1,341,045    |
| 1913 | 1,861  | 24,936   | 1936   | 144,314   | 1,412,788    |
| 1914 | 6,522  | 115,396  | 1937   | 153,685   | 1,461,057    |
| 1915 | 5,799  | 83,485   |        |           |              |
| 1916 | 10,593 | 264,825  | Totals | 1,635,185 | \$25,172,821 |

## CHAPTER SEVEN

### BY COUNTIES

#### Introductory.

The State of California includes a total area of 158,297 square miles, of which 155,652 square miles are of land. The maximum width is 235 miles, the minimum 148 miles, and the length from the northwest corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1930 census figures show a total population for California of 5,672,009. Minerals of commercial value exist in every county, and during 1936 some active production was reported to the State Division of Mines from all of the fifty-eight.

#### Rank of Counties in Mineral Yield, 1937.

Of the ten leading counties in point of total value of mineral output for 1937, the first five, viz., Los Angeles, Kern, Fresno, Orange, and Ventura, also Kings eighth and Santa Barbara ninth, owe their position to petroleum and natural gas. Los Angeles County, due to crude oil, led all other counties in 1937 and is credited with 28% of the State's total mineral value, holding this position since 1923 when it passed Kern, which previously led the State for many years. San Bernardino (sixth) owes its position to cement, borates, and potash. Nevada (seventh) owes its position to gold; and Sacramento (tenth) to gold.

There were twenty-eight counties having a mineral production valued in excess of a million dollars in 1937, in seven of which petroleum was an important item; in thirteen gold; in six each, natural gas and cement; in two, borates and miscellaneous stone; and in one each potash and soda, diatomite.

In point of variety and diversity San Bernardino County led all others in 1937 with twenty-six different mineral substances on its commercial list; followed by Los Angeles County with twenty-two; Inyo County with eighteen; Kern County with sixteen; Fresno County with fifteen; Imperial and San Diego counties each with fourteen; El Dorado, Riverside, and San Luis Obispo counties each with thirteen.

teen; Calaveras and Placer counties each with twelve; Butte and Siskiyou counties each with eleven; Mariposa, Monterey, Santa Barbara, Tulare, and Tuolumne counties each with ten.

| No. | County         | Value         | No. | County          | Value         |
|-----|----------------|---------------|-----|-----------------|---------------|
| 1   | Los Angeles    | \$100,337,635 | 31  | Mono            | \$804,925     |
| 2   | Kern           | 74,162,134    | 32  | Santa Clara     | 722,903       |
| 3   | Fresno         | 41,178,791    | 33  | Trinity         | 721,290       |
| 4   | Orange         | 22,659,380    | 34  | San Joaquin     | 706,620       |
| 5   | Ventura        | 19,230,720    | 35  | Imperial        | 677,401       |
| 6   | San Bernardino | 16,012,330    | 36  | San Diego       | 591,479       |
| 7   | Nevada         | 11,385,056    | 37  | San Benito      | 504,510       |
| 8   | Kings          | 11,008,597    | 38  | Lake            | 392,585       |
| 9   | Santa Barbara  | 10,709,056    | 39  | Napa            | 356,146       |
| 10  | Sacramento     | 4,230,689     | 40  | San Luis Obispo | 323,691       |
| 11  | Riverside      | 4,057,127     | 41  | Tulare          | 314,952       |
| 12  | Amador         | 3,917,866     | 42  | Marin           | 300,204       |
| 13  | Calaveras      | 3,279,250     | 43  | Sonoma          | 273,063       |
| 14  | El Dorado      | 2,607,972     | 44  | Monterey        | 262,651       |
| 15  | Yuba           | 2,587,748     | 45  | Solano          | 145,567       |
| 16  | Merced         | 2,535,126     | 46  | Glenn           | 136,368       |
| 17  | Alameda        | 2,476,302     | 47  | Madera          | 133,165       |
| 18  | Plumas         | 2,354,957     | 48  | Mendocino       | 114,705       |
| 19  | San Mateo      | 2,310,784     | 49  | Humboldt        | 100,715       |
| 20  | Shasta         | 2,199,423     | 50  | Lassen          | 86,240        |
| 21  | Santa Cruz     | 2,074,463     | 51  | Tehama          | 65,193        |
| 22  | Contra Costa   | 1,867,309     | 52  | Yolo            | 44,171        |
| 23  | Butte          | 1,798,992     | 53  | San Francisco   | 41,825        |
| 24  | Placer         | 1,754,040     | 54  | Modoc           | 36,990        |
| 25  | Inyo           | 1,439,009     | 55  | Del Norte       | 30,647        |
| 26  | Mariposa       | 1,270,774     | 56  | Sutter          | 22,959        |
| 27  | Siskiyou       | 1,200,351     | 57  | Alpine          | 22,791        |
| 28  | Tuolumne       | 1,012,180     | 58  | Colusa          | 9,424         |
| 29  | Sierra         | 974,680       |     | Total value     | \$361,515,951 |
| 30  | Stanislaus     | 940,030       |     |                 |               |

### ALAMEDA

*Land area: 732 square miles.*

*Population: 475,153 (1930 census).*

*Location: East side of San Francisco Bay.*

*County seat: Oakland.*

*References: State Mineralogist Report XVII : XVIII : XX : XXVI (Oct., 1929).*

Alameda, while in no sense one of the 'mining counties,' came seventeenth on the list of counties as to value, with a mineral production for 1937 worth \$2,476,302, and had seven different substances. This was an increase over the 1936 output which was valued at \$2,413,115. Commercial production for 1937 was as follows:

| Substance           | Amount     | Value       |
|---------------------|------------|-------------|
| Clay                | 5,506 tons | \$9,712     |
| Miscellaneous stone |            | 1,361,781   |
| Unapportioned*      |            | 1,104,809   |
| Total value         |            | \$2,476,302 |

\* Includes brick and hollow building-tile, bromine, lime, and salt.

## ALPINE

*Land area:* 776 square miles.

*Population:* 236 (1930 census).

*Location:* On eastern border of State, south of Lake Tahoe.

*County seat:* Markleeville.

*References:* State Mineralogist Report XV : XVII : XVIII : XXVII (Oct., 1931).

Alpine County ranked fifty-seventh in value of output for 1937, which was \$22,791, compared with \$9,541 in 1936.

Commercial production for 1937 was as follows:

| Substance      | Amount          | Value    |
|----------------|-----------------|----------|
| Copper         | 827 lbs.        | \$100    |
| Gold           | 13,790          |          |
| Lead           | 6,991 lbs.      | 413      |
| Silver         | 8,950 fine ozs. | 6,923    |
| Other minerals |                 | 1,565    |
| Total value    |                 | \$22,791 |

## AMADOR

*Land area:* 601 square miles.

*Population:* 8494 (1930 census).

*Location:* East-central part of State—Mother Lode District.

*County seat:* Jackson.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII : (April, 1927) : XXX.

Amador County ranked twelfth as to value of mineral output for 1937, with nine different substances worth \$3,917,866, compared with \$3,617,449 in 1936.

Amador at one time led the State in gold production, though exceeded in 1920-1923 and in 1926-1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929-1930 and 1937 by Nevada only, and in 1931-1936 by Nevada and Sacramento.

Commercial production for 1937 was as follows:

| Substance      | Amount           | Value       |
|----------------|------------------|-------------|
| Clay           | 66,397 tons      | \$107,212   |
| Copper         | 18,579 lbs.      | 2,248       |
| Gold           |                  | 3,712,835   |
| Lead           | 7,004 lbs.       | 413         |
| Silver         | 23,324 fine ozs. | 18,041      |
| Unapportioned* |                  | 77,117      |
| Total value    |                  | \$3,917,866 |

\* Includes brick, coal, platinum, miscellaneous stone.

**BUTTE**

*Land area:* 1722 square miles.

*Population:* 34,010 (1930 census).

*Location:* North-central portion of State.

*County seat:* Oroville.

*References:* State Mineralogist Report XV : XVII : XVIII : XXIV : XXVI (Oct., 1930) : XXXI (Jan., 1936).

Butte County ranked twenty-third in regard to value of mineral output in 1937, with eleven different substances, having a total value of \$1,798,992, as compared with \$1,393,874 in 1936.

Commercial production for 1937 was as follows:

| Substance                | Amount           | Value       |
|--------------------------|------------------|-------------|
| Copper.....              | 2,545 lbs.       | \$308       |
| Gold.....                |                  | 1,558,305   |
| Silver.....              | 23,728 fine ozs. | 18,354      |
| Miscellaneous stone..... |                  | 219,412     |
| Unapportioned*.....      |                  | 2,613       |
| Total value.....         |                  | \$1,798,992 |

\* Includes lead, mineral water, natural gas, platinum, salt, soapstone.

**CALAVERAS**

*Land area:* 1027 square miles.

*Population:* 6009 (1930 census).

*Location:* East-central portion of State—Mother Lode District.

*County seat:* San Andreas.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI : XXXII (July, 1936).

Calaveras County ranked thirteenth in California in regard to value of mineral output in 1937, with a total of \$3,279,250, as compared with \$3,513,180 in 1936.

Commercial production for 1937 consisting of ten different substances, was as follows:

| Substance                | Amount           | Value       |
|--------------------------|------------------|-------------|
| Copper.....              | 9,703 lbs.       | \$1,174     |
| Gold.....                |                  | 1,730,435   |
| Lead.....                | 1,816 lbs.       | 107         |
| Silver.....              | 12,733 fine ozs. | 9,849       |
| Miscellaneous stone..... |                  | 76,880      |
| Unapportioned*.....      |                  | 1,460,805   |
| Total value.....         |                  | \$3,279,250 |

\* Includes cement, clay, mineral water, platinum, slate.

**COLUSA***Land area:* 1140 square miles.*Population:* 10,257 (1930 census).*Location:* Sacramento Valley.*County seat:* Colusa.*References:* State Mineralogist Report XIV : XVII : XVIII : XXV : (April, 1929).

Colusa County ranked fifty-eighth in regard to the value of mineral output in 1937 with three different mineral substances, worth a total of \$9,424, as compared with \$15,483 in 1936.

Commercial production for 1937 included mineral water, quicksilver, and miscellaneous stone.

**CONTRA COSTA***Land area:* 714 square miles.*Population:* 78,554 (1930 census).*Location:* East side of San Francisco Bay.*County seat:* Martinez.*References:* State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927).

Contra Costa County stands twenty-second on the list in respect to value of mineral output for 1937, with eight different substances worth \$1,867,309, as compared with \$1,706,131 in 1936.

Commercial production for 1937 was as follows:

| Substance                      | Value       |
|--------------------------------|-------------|
| Brick and hollow building tile | \$497,543   |
| Miscellaneous stone            | 518,760     |
| Unapportioned*                 | 551,006     |
| Total value                    | \$1,867,309 |

\* Includes cement, clay, mineral water, quicksilver, silica (glass sand).

**DEL NORTE***Land area:* 1024 square miles.*Population:* 4734 (1930 census).*Location:* Extreme northwest corner of State.*County seat:* Crescent City.*References:* State Mineralogist Report XIV : XVII : XXI (July, 1925) : XXIX (Jan.-April, 1933).

Del Norte County was in fifty-fifth place as to mineral production for 1937 with four different substances worth \$30,647, as compared with \$16,776 in 1936.

Commercial production for 1937 was as follows:

| Substance      | Amount       | Value    |
|----------------|--------------|----------|
| Gold           |              | \$2,625  |
| Silver         | 10 fine ozs. | 8        |
| Unapportioned* |              | 28,014   |
| Total value    |              | \$30,647 |

\*Includes chromite and miscellaneous stone.

**EL DORADO**

*Land area:* 1753 square miles.

*Population:* 8303 (1930 census).

*Location:* East-central portion of the State, northernmost of the Mother Lode counties.

*County seat:* Placerville.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI.

El Dorado County, which contains the location where gold in California was first heralded to the world, comes fourteenth on the list of counties ranked according to value for 1937, with thirteen different mineral substances worth \$2,607,972. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's total for cement. The 1936 output was valued at \$2,796,980.

Commercial production for 1937 was as follows:

| Substance                | Amount           | Value              |
|--------------------------|------------------|--------------------|
| Copper.....              | 65,353 lbs.      | \$7,908            |
| Gold.....                |                  | 1,719,795          |
| Lead.....                | 6,011 lbs.       | 355                |
| Limestone.....           | 227,721 tons     | 448,130            |
| Silver.....              | 10,650 fine ozs. | 8,238              |
| Miscellaneous stone..... |                  | 20,784             |
| Unapportioned*.....      |                  | 402,762            |
| <b>Total Value.....</b>  |                  | <b>\$2,607,972</b> |

\* Includes chromite, lime, mineral water, platinum, slate, soapstone.

**FRESNO**

*Land area:* 5950 square miles.

*Population:* 144,369 (1930 census).

*Location:* South-central portion of State.

*County seat:* Fresno.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXV (July, 1929).

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1937 of fifteen different mineral substances, with a total value of \$41,178,791, as compared with the 1936 value of \$40,245,111.

Commercial production for 1937 was as follows:

| Substance                | Amount               | Value               |
|--------------------------|----------------------|---------------------|
| Gold.....                |                      | \$8,540             |
| Natural gas.....         | 67,274,419 M cu. ft. | 4,308,280           |
| Petroleum.....           | 29,091,322 bbls.     | 36,521,804          |
| Silver.....              | 55 fine ozs.         | 43                  |
| Miscellaneous stone..... |                      | 187,379             |
| Unapportioned*.....      |                      | 152,745             |
| <b>Total value.....</b>  |                      | <b>\$41,178,791</b> |

\* Includes brick and hollow building-tile, chromite, clay (pottery and oil well drilling-mud), copper, feldspar, granite, gypsum, limestone (marl), quicksilver.

**GLENN***Land area:* 1259 square miles.*Population:* 10,935 (1930 census).*Location:* West side of Sacramento Valley.*County seat:* Willows.*References:* State Mineralogist Report XIV : XVII : XVIII.

Glenn County stands forty-sixth as a mineral producing county of the State for 1937 and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1937 totaled \$136,368, which is an increase over \$134,466, the 1936 total.

**HUMBOLDT***Land area:* 3634 square miles.*Population:* 43,189 (1930 census).*Location:* Northwestern portion of State, bordering on Pacific Ocean.*County seat:* Eureka.*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925).

Humboldt County ranked forty-ninth in the value of its mineral output among the counties of the State for 1937, with seven different mineral substances valued at \$100,715, compared with the 1936 output worth \$78,098.

Commercial production for 1937 was as follows:

| Substance           | Amount        | Value     |
|---------------------|---------------|-----------|
| Gold                |               | \$27,230  |
| Silver              | 122 fine ozs. | .94       |
| Miscellaneous stone |               | 70,596    |
| Unapportioned*      |               | 2,795     |
| Total value         |               | \$100,715 |

\* Includes brick, clay, natural gas, platinum.

**IMPERIAL***Land area:* 4089 square miles.*Population:* 60,894 (1930 census).*Location:* Extreme southeast corner of the State.*County seat:* El Centro.*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926).

Imperial County ranked thirty-fifth in total value of mineral output for 1937, with fourteen different mineral substances, worth \$677,401, compared with \$256,941 for 1936.

Commercial production for 1937 was as follows:

| Substance                | Amount          | Value     |
|--------------------------|-----------------|-----------|
| Copper.....              | 118,138 lbs.    | \$14,295  |
| Gold.....                |                 | 298,095   |
| Lead.....                | 8,210 lbs.      | 484       |
| Silver.....              | 3,287 fine ozs. | 2,542     |
| Miscellaneous stone..... |                 | 197,981   |
| Unapportioned*.....      |                 | 164,004   |
| Total value.....         |                 | \$677,401 |

\*Includes carbon dioxide, clay, gems (Iceland spar), gypsum, mica (sericite), pumice, salt, kyanite.

### INYO

*Land area:* 10,019 square miles.

*Population:* 6557 (1930 census).

*Location:* Lies on eastern border of State, north of San Bernardino County.

*County seat:* Independence.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII : XXX : XXXIII.

Inyo County's mineral output for 1937 reached a total value of \$1,439,009, having eighteen different mineral substances and standing twenty-fifth among the counties of the State as to value of production. The 1936 yield was worth \$1,470,847.

Commercial production for 1937 was as follows:

| Substance                    | Amount            | Value       |
|------------------------------|-------------------|-------------|
| Copper.....                  | 71,080 lbs.       | \$8,601     |
| Gold.....                    |                   | 620,585     |
| Lead.....                    | 1,908,280 lbs.    | 112,589     |
| Pumice and volcanic ash..... | 2,721 tons        | 29,518      |
| Silver.....                  | 102,003 fine ozs. | 78,899      |
| Zinc.....                    | 22,364 lbs.       | 1,454       |
| Miscellaneous stone.....     |                   | 22,087      |
| Unapportioned*.....          |                   | 565,276     |
| Total value.....             |                   | \$1,439,009 |

\* Includes bentonite, borates, dolomite, iron ore, quicksilver, slate, talc, soda, sulphur, tungsten.

### KERN

*Land area:* 8003 square miles.

*Population:* 82,219 (1930 census).

*Location:* South-central portion of State.

*County seat:* Bakersfield.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) : XXX.

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1937, for which petroleum is responsible. The 1936 production consisted of sixteen different mineral substances valued at \$74,162,134, compared with the 1936 output worth \$65,344,764.

Commercial production for 1937 was as follows:

| Substance                                | Amount               | Value        |
|--|----------------------|--------------|
| Clay (pottery and oil well drilling mud) | 42,628 tons          | \$130,482    |
| Copper                                   | 5,504 lbs.           | 666          |
| Gold                                     |                      | 2,465,085    |
| Lead                                     | 2,923 lbs.           | 172          |
| Natural gas                              | 65,142,854 M cu. ft. | 3,950,521    |
| Petroleum                                | 69,878,714 bbls.     | 61,905,918   |
| Silver                                   | 726,197 fine ozs.    | 561,712      |
| Miscellaneous stone                      |                      | 237,757      |
| Unapportioned*                           |                      | 4,909,821    |
| Total value                              |                      | \$74,162,134 |

\* Includes borates, brick, cement, volcanic ash, quicksilver, salt, tungsten ore.

### KINGS

*Land area: 1559 square miles.*

*Population: 25,277 (1930 census).*

*Location: South-central portion of the State.*

*County seat: Hanford.*

*References: State Mineralogist Report XIV : XVII : XVIII : XXVI (Oct., 1930).*

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked ninth in total value of annual mineral production, seventh in 1930, third in 1931, and eighth in 1936-1937.

Commercial production for 1937 was as follows:

| Substance      | Amount               | Value        |
|----------------|----------------------|--------------|
| Natural gas    | 45,924,599 M cu. ft. | \$2,944,800  |
| Petroleum      | 5,800,589 bbls.      | 8,062,833    |
| Other minerals |                      | 964          |
| Total value    |                      | \$11,008,597 |

### LAKE

*Land area: 1278 square miles.*

*Population: 7166 (1930 census).*

*Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.*

*County seat: Lakeport.*

*References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929).*

Lake County was in thirty-eighth place as to the value of mineral output for 1937, with four different mineral substances, worth \$392,585, compared with \$341,066 for 1936.

Commercial production for 1937 was as follows:

| Substance           | Amount       | Value     |
|---------------------|--------------|-----------|
| Mineral water       | 38,489 gals. | \$33,858  |
| Quicksilver         | 4,012 flasks | 341,444   |
| Miscellaneous stone |              | 17,258    |
| Other minerals      |              | 25        |
| Total value         |              | \$392,585 |

## LASSEN

*Land area:* 4531 square miles.

*Population:* 12,587 (1930 census).

*Location:* Northeast portion of State.

*County seat:* Susanville.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in fiftieth place as a mineral producer for 1937, with output of \$86,240, being an increase from \$66,283, which was the value for the previous year.

Commercial production for 1937 was as follows:

| Substance                | Amount          | Value    |
|--------------------------|-----------------|----------|
| Gold.....                |                 | \$21,175 |
| Silver.....              | 1,465 fine ozs. | 1,133    |
| Miscellaneous stone..... |                 | 63,257   |
| Other minerals.....      |                 | 675      |
| Total value.....         |                 | \$86,240 |

## LOS ANGELES

*Land area:* 4067 square miles.

*Population:* 2,201,526 (1930 census).

*Location:* One of the southwestern coast counties.

*County seat:* Los Angeles.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIII (July, 1937).

The mineral production for Los Angeles County for the year 1937 amounted in value to \$100,337,635, as compared with the 1936 output worth \$86,227,432. This accounted for 28% of the entire State's total for 1937 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1937, consisting of 22 substances, was as follows:

| Substance                 | Amount               | Value         |
|---------------------------|----------------------|---------------|
| Brick.....                | 80,400 M             | \$1,586,821   |
| Hollow building-tile..... | 6,355 tons           | 45,122        |
| Clay.....                 | 17,828 tons          | 15,083        |
| Gold.....                 |                      | 140,070       |
| Lead.....                 | 7,046 lbs.           | 416           |
| Mineral water.....        | 8,615,029 gals.      | 750,512       |
| Natural gas.....          | 65,459,580 M cu. ft. | 4,655,204     |
| Petroleum.....            | 86,659,477 bbls.     | 83,922,309    |
| Silver.....               | 2,308 fine ozs.      | 1,785         |
| Miscellaneous stone.....  |                      | 8,655,018     |
| Unapportioned*            |                      | 565,295       |
| Total value.....          |                      | \$100,337,635 |

\* Includes copper, diatomite, dolomite, granite (mica schist used for building stone), iodine, limestone, marble (limestone used for building), salt, sandstone, slate, soapstone.

**MADERA**

*Land area:* 2112 square miles.

*Population:* 17,152 (1930 census).

*Location:* East-central portion of State.

*County seat:* Madera.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXIV (Oct., 1928) : XXX : XXXI.

Madera County was in forty-seventh place as a mineral producer for 1937, with an output of seven different substances valued at \$133,165, compared with \$222,592 for 1936.

Commercial production for 1937 was as follows:

| Substance           | Amount        | Value     |
|---------------------|---------------|-----------|
| Copper              | 2,007 lbs.    | \$243     |
| Gold                | 13,615        |           |
| Silver              | 142 fine ozs. | 110       |
| Miscellaneous stone |               | 70,502    |
| Unapportioned*      |               | 48,695    |
| Total value         |               | \$133,165 |

\* Includes granite, pumice and volcanic ash.

**MARIN**

*Land area:* 529 square miles.

*Population:* 41,635 (1930 census).

*Location:* Adjoins San Francisco on the north.

*County seat:* San Rafael.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXIX.

Marin County had forty-second place as to the value of mineral output for 1937, with four different mineral substances. The total was \$300,204, compared with \$222,974 in 1936.

Commercial production for 1937 was as follows:

| Substance           | Value     |
|---------------------|-----------|
| Miscellaneous stone | \$296,844 |
| Other minerals      | 3,360     |
| Total value         | \$300,204 |

**MARIPOSA**

*Land area:* 1453 square miles.

*Population:* 2530 (1930 census).

*Location:* Most southerly of the Mother Lode counties. East central portion of State.

*County seat:* Mariposa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXIV (April, 1928) : XXXI (Jan., 1935).

Mariposa County is one of the distinctly 'mining' counties of the State, although it stands but twenty-sixth on the list of counties in

regard to the value of its mineral output for 1937, with a total of \$1,270,774, as compared with \$1,130,018 for 1936. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production, with ten different mineral substances, for 1937 was as follows:

| Substance                | Amount          | Value       |
|--------------------------|-----------------|-------------|
| Copper.....              | 11,927 lbs.     | \$1,443     |
| Gold.....                |                 | 1,025,010   |
| Silver.....              | 7,866 fine ozs. | 6,084       |
| Miscellaneous stone..... |                 | 65,283      |
| Unapportioned*.....      |                 | 172,954     |
| Total value.....         |                 | \$1,270,774 |

\*Includes barite, lead, granite, mica (sericite), pumice.

### MENDOCINO

*Land area:* 3452 square miles.

*Population:* 23,491 (1930 census).

*Location:* Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.

*County seat:* Ukiah.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX.

Mendocino County's mineral output for 1937 was valued at \$114,705, which gave it a rank of forty-eighth among the counties of the State as a mineral producer; compared with \$35,596 for 1936.

Commercial production for 1937 included natural gas and miscellaneous stone.

### MERCED

*Land area:* 1995 square miles.

*Population:* 36,900 (1930 census).

*Location:* About the geographical center of the State.

*County seat:* Merced.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan., 1935).

Merced County ranks sixteenth as to the value of mineral output for 1937, with six different substances worth \$2,535,126, compared with \$2,009,328 for 1936.

Commercial production for 1937 was as follows:

| Substance                | Amount          | Value       |
|--------------------------|-----------------|-------------|
| Gold.....                |                 | \$1,858,815 |
| Silver.....              | 5,525 fine ozs. | 4,274       |
| Miscellaneous stone..... |                 | 36,157      |
| Other minerals.....      |                 | 635,880     |
| Total value.....         |                 | \$2,535,126 |

**MODOC**

*Land area:* 3823 square miles.

*Population:* 8038 (1930 census).

*Location:* The extreme northeast corner of the State.

*County seat:* Alturas.

*References:* State Mineralogist Report XV : XVII : XVIII : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Modoc County, in fifty-fourth place, with six different mineral substances, reported a commercial production as follows:

| Substance           | Amount      | Value    |
|---------------------|-------------|----------|
| Gold                |             | \$210    |
| Silver              | 4 fine ozs. | 3        |
| Miscellaneous stone |             | 35,381   |
| Unapportioned*      |             | 1,396    |
| Total value         |             | \$36,990 |

\* Includes gems and salt.

**MONO**

*Land area:* 3030 square miles.

*Population:* 1359 (1930 census).

*Location:* Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.

*County seat:* Bridgeport.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXIII (Oct., 1927) : XXX.

Mono County, in thirty-first place with seven different mineral substances, reported a commercial production for 1937, as follows:

| Substance           | Amount            | Value     |
|---------------------|-------------------|-----------|
| Cooper              | 13,216 lbs.       | \$1,599   |
| Gold                |                   | 182,105   |
| Lead                | 12,938 lbs.       | 763       |
| Silver              | 631,347 fine ozs. | 488,347   |
| Miscellaneous stone |                   | 87,253    |
| Other minerals      |                   | 44,858    |
| Total value         |                   | \$804,925 |

**MONTEREY**

*Land area:* 3330 square miles.

*Population:* 53,668 (1930 census).

*Location:* West-central portion of State, bordering on Pacific Ocean.

*County seat:* Salinas.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Jan., 1925) : XXXI.

Monterey County produced ten different mineral substances during 1937, having a total value of \$262,651, as compared with \$187,750 for 1936.

In forty-fourth place, commercial production for 1937 was as follows:

| Substance           | Amount      | Value     |
|---------------------|-------------|-----------|
| Gold                |             | \$1,960   |
| Silver              | 4 fine ozs. | 3         |
| Miscellaneous stone |             | 206,700   |
| Unapportioned*      |             | 53,988    |
| Total value         |             | \$262,651 |

\* Includes diatomite, dolomite, natural gas, quicksilver, salt, sandstone, silica.

### NAPA

*Land area: 783 square miles.*

*Population: 22,832 (1930 census).*

*Location: Directly north of San Francisco Bay—one of the 'bay counties.'*

*County seat: Napa.*

*References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929).*

In 1937 the value of Napa County's mineral output was \$356,146, placing it in thirty-ninth place in the list of counties, as compared with \$567,153 for 1936.

With nine different mineral substances, commercial production for 1937 was as follows:

| Substance           | Amount           | Value     |
|---------------------|------------------|-----------|
| Copper              |                  | \$140     |
| Gold                | 1,156 lbs.       | 12,355    |
| Mineral water       | 77,531 gals.     | 15,683    |
| Quicksilver         | 329 flasks       | 26,051    |
| Silver              | 66,763 fine ozs. | 51,641    |
| Miscellaneous stone |                  | 246,665   |
| Other minerals      |                  | 3,611     |
| Total value         |                  | \$356,146 |

### NEVADA

*Land area: 974 square miles.*

*Population: 10,589 (1930 census).*

*Location: North of Lake Tahoe on the eastern border of the State.*

*County seat: Nevada City.*

*References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII.*

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918-1921, also 1923. In 1922, 1924, 1929 to 1937, Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands seventh on the list of counties in regard to value of its mineral output for 1937, with nine different mineral substances worth \$11,385,

056, as compared with \$10,322,695 for 1936. The increase was due to gold and silver.

Commercial production for 1937 was as follows:

| Substance           | Amount            | Value        |
|---------------------|-------------------|--------------|
| Copper              | 178,643 lbs.      | \$21,616     |
| Gold                |                   | 10,805,200   |
| Lead                |                   | 18,644       |
| Silver              | 316,006 lbs.      | 391,502      |
| Miscellaneous stone | 506,143 fine ozs. | 144,300      |
| Unapportioned*      |                   | 3,794        |
| Total value         |                   | \$11,385,056 |

\* Includes granite, mineral paint, platinum.

### ORANGE

*Land area: 795 square miles.*

*Population: 118,611 (1930 census).*

*Location: Southwest portion of the State, bordering Pacific Ocean.*

*County seat: Santa Ana.*

*References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI.*

Orange County, in fourth place as to value of mineral output for 1937, produced seven mineral substances, worth \$22,659,380, as compared with \$22,132,919 for 1936.

Commercial production for 1937 was as follows:

| Substance           | Amount               | Value        |
|---------------------|----------------------|--------------|
| Clay                | 29,415 tons          | \$84,513     |
| Natural gas         | 23,535,696 M cu. ft. | 1,599,811    |
| Petroleum           | 22,060,820 bbls.     | 20,854,524   |
| Miscellaneous stone |                      | 112,025      |
| Unapportioned*      |                      | 8,507        |
| Total value         |                      | \$22,659,380 |

\*Includes brick and salt.

### PLACER

*Land area: 1395 square miles.*

*Population: 24,442 (1930 census).*

*Location: Eastern border of State directly west of Lake Tahoe.*

*County seat: Auburn.*

*References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1937) : XXXI : XXXII (Jan., 1936).*

Placer County, in twenty-fourth place, with twelve different mineral substances, had a commercial production for 1937 as follows, compared with \$1,554,865 for the previous year:

| Substance      | Amount           | Value       |
|----------------|------------------|-------------|
| Clay           | 70,960 tons      | \$107,138   |
| Copper         | 5,959 lbs.       | 721         |
| Gold           |                  | 1,594,320   |
| Lead           | 10,432 lbs.      | 615         |
| Silver         | 25,970 fine ozs. | 20,088      |
| Unapportioned* |                  | 31,158      |
| Total value    |                  | \$1,754,040 |

\* Includes brick and hollow building-tile, chromite, granite, mineral paint, platinum, miscellaneous stone, zircon sand

### PLUMAS

*Land area:* 2594 square miles.

*Population:* 7909 (1930 census).

*Location:* Northeastern border of State, south of Lassen County.

*County seat:* Quincy.

*References:* State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIII (April, 1937).

Plumas County's mineral output for 1937 with seven different mineral substances was valued at \$2,354,957, as compared with \$1,923,777 for 1936.

In eighteenth place, commercial production for 1937 was as follows:

| Substance           | Amount            | Value       |
|---------------------|-------------------|-------------|
| Copper              | 9,879,959 lbs.    | \$1,195,475 |
| Gold                |                   | 911,610     |
| Silver              | 293,854 fine ozs. | 227,296     |
| Miscellaneous stone |                   | 20,317      |
| Unapportioned*      |                   | 259         |
| Total value         |                   | \$2,354,957 |

\* Includes lead and granite.

### RIVERSIDE

*Land area:* 7240 square miles.

*Population:* 82,078 (1930 census).

*Location:* Southern portion of State.

*County seat:* Riverside.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXV (Oct., 1929) : XXX : XXXI.

Riverside is the fourth county in the State in size and the eleventh in regard to the total value of mineral output for 1937. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed thirteen different mineral substances commercially produced in 1937 with a total value of \$4,057,127, compared with the 1936 output which was valued at \$4,449,170.

Commercial production for 1937 was as follows:

| Substance           | Amount          | Value       |
|---------------------|-----------------|-------------|
| Clay                | 64,462 tons     | \$117,798   |
| Gold                |                 | 215,040     |
| Lead                | 4,028 lbs.      | 238         |
| Silver              | 5,519 fine ozs. | 4,269       |
| Miscellaneous stone |                 | 342,073     |
| Unapportioned*      |                 | 3,377,709   |
| Total value         |                 | \$4,057,127 |

\* Includes brick and hollow building-tile, cement, copper, granite, gypsum, mineral water, silica.

### SACRAMENTO

*Land area:* 983 square miles.

*Population:* 141,915 (1930 census).

*Location:* North-central portion of State.

*County seat:* Sacramento.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXI (Jan., 1925) : XXXI.

Sacramento stands tenth among the counties of the State as a mineral producer, the output, principally gold, for 1937 being valued at \$4,230,689, as compared with the 1936 production worth \$4,254,685. In regard to gold output alone, this county ranks third, being exceeded by Nevada and Amador, the Sacramento product coming from the dredges. With seven mineral substances, commercial production for 1937 was as follows:

| Substance           | Amount          | Value       |
|---------------------|-----------------|-------------|
| Gold                |                 | \$3,600,765 |
| Silver              | 4,342 fine ozs. | 3,359       |
| Miscellaneous stone |                 | 513,699     |
| Unapportioned*      |                 | 112,866     |
| Total value         |                 | \$4,230,689 |

\* Includes brick and hollow building-tile, natural gas, platinum.

### SAN BENITO

*Land area:* 1392 square miles.

*Population:* 11,310 (1930 census).

*Location:* West-central portion of State.

*County seat:* Hollister.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXII (April, 1926).

San Benito County ranked thirty-seventh among the counties in regard to the value of total mineral production for 1937, having an output worth \$504,510, as compared with \$348,812 for the previous year.

Commercial production for 1937 was as follows:

| Substance      | Amount       | Value     |
|----------------|--------------|-----------|
| Quicksilver    | 1,756 flasks | \$146,524 |
| Unapportioned* |              | 357,986   |
| Total value    |              | \$504,510 |

\* Includes bentonite, coal, dolomite, miscellaneous stone.

### SAN BERNARDINO

*Land area:* 20,157 square miles.

*Population:* 133,827 (1930 census).

*Location:* Southeastern portion of State.

*County seat:* San Bernardino.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX.

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1937, with a total of \$16,012,330, as compared with the 1936 total of \$15,396,166.

San Bernardino, for several years (except 1918), has led all other counties in the State in point of variety of minerals, producing commercially in 1937 a total of twenty-six different substances.

Commercial production for 1937 was as follows:

| Substance           | Amount            | Value        |
|---------------------|-------------------|--------------|
| Clay                | 5,765 tons        | \$50,252     |
| Copper              | 28,760 lbs.       | 3,480        |
| Gold                |                   | 218,925      |
| Lead                | 106,211 lbs.      | 6,266        |
| Silver              | 359,201 fine ozs. | 277,842      |
| Zinc                | 17,279 lbs.       | 1,123        |
| Limestone           | 25,967 tons       | 76,850       |
| Miscellaneous stone |                   | 307,337      |
| Unapportioned*      |                   | 15,070,255   |
| Total value         |                   | \$16,012,330 |

\* Includes bentonite, borates, brick, calcium chloride, cement, fluorspar, granite, iron ore, lime, onyx, mineral water, soda, talc, salt, potash, petroleum, tungsten ore.

### SAN DIEGO

*Land area:* 4221 square miles.

*Population:* 209,477 (1930 census).

*Location:* Extreme southwest corner of State.

*County seat:* San Diego.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925), XXX.

San Diego County ranked thirty-sixth in the total value of its mineral output for the year 1937 with fourteen different mineral substances on the commercial list. The value for 1937 was \$591,479, as compared with the 1936 output worth \$582,556.

Commercial production for 1937 was as follows:

| Substance           | Amount       | Value     |
|---------------------|--------------|-----------|
| Gold                |              | \$2,100   |
| Silver              | 18 fine ozs. | 14        |
| Miscellaneous stone |              | 312,939   |
| Unapportioned*      |              | 276,426   |
| Total value         |              | \$591,479 |

\* Includes brick and hollow building-tile, bromine, clay, gems, granite, magnesium chloride, mineral water, salt, silica (quartz), feldspar.

### SAN FRANCISCO

*Land area: 46½ square miles.*

*Population: 637,212 (1930 census).*

*County seat: San Francisco.*

*Reference: State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929).*

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, and mineral water.

In fifty-third place, commercial production for 1937 was as follows:

| Substance      | Value    |
|----------------|----------|
| Unapportioned* | \$41,825 |

\* Includes mineral water and miscellaneous stone.

### SAN JOAQUIN

*Land area: 1448 square miles.*

*Population: 102,871 (1930 census).*

*Location: Central portion of State.*

*County seat: Stockton.*

*References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).*

San Joaquin County reported a mineral production for 1937 having a total value of \$706,620, as compared with \$461,064 for 1936. In thirty-fourth place, commercial production for 1937 was as follows:

| Substance           | Amount              | Value     |
|---------------------|---------------------|-----------|
| Gold                |                     | \$79,765  |
| Natural gas         |                     | 484,381   |
| Silver              | 5,740,226 M cu. ft. | 125       |
| Miscellaneous stone | 162 fine ozs.       | 95,869    |
| Other minerals      |                     | 46,480    |
| Total value         |                     | \$706,620 |

## SAN LUIS OBISPO

*Land area:* 3334 square miles.

*Population:* 29,617 (1930).

*Location:* Bordered by Kern County on the east and the Pacific Ocean on the west.

*County seat:* San Luis Obispo.

*References:* State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935).

The total value of the mineral production of San Luis Obispo County in 1937, with thirteen different mineral substances, was \$323,691 as compared with \$352,346 in 1936.

In fortieth place, commercial production for 1937 was as follows:

| Substance        | Amount       | Value     |
|------------------|--------------|-----------|
| Gold.....        |              | \$9,625   |
| Quicksilver..... | 2,133 flasks | 179,731   |
| Silver.....      | 19 fine ozs. | 15        |
| Unapportioned*   |              | 134,320   |
| Total value..... |              | \$323,691 |

\* Includes brick and hollow building-tile, clay (oil-well drilling-mud), limestone, marble (limestone used for building), mineral water, petroleum, volcanic ash, sandstone, miscellaneous stone.

## SAN MATEO

*Land area:* 447 square miles.

*Population:* 77,338 (1930 census).

*Location:* Peninsula, adjoined by San Francisco on the north.

*County seat:* Redwood City.

*References:* State Mineralogist Report XVII : XVIII : XXV (April, 1929) : XXIX.

San Mateo County had a mineral output in 1937 of six different substances, having a total value of \$2,310,784, as compared with the 1936 production worth \$2,410,807.

In nineteenth place, commercial production for 1937 was as follows:

| Substance                | Value       |
|--------------------------|-------------|
| Miscellaneous stone..... | \$85,680    |
| Unapportioned*           | 2,225,104   |
| Total value.....         | \$2,310,784 |

\* Includes cement, limestone (shells), magnesium carbonate, salt.

## SANTA BARBARA

*Land area:* 2740 square miles.

*Population:* 65,075 (1930 census).

*Location:* Southwestern portion of State, adjoining San Luis Obispo on the south.

*County seat:* Santa Barbara.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Oct., 1925) : XXXII.

Santa Barbara County owes its position of ninth place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1937 was \$10,709,056, as compared with the 1936 output of \$9,693,339.

With ten different substances, commercial production for 1937 was as follows:

| Substance           | Amount              | Value        |
|---------------------|---------------------|--------------|
| Natural gas.....    | 5,557,621 M cu. ft. | \$328,572    |
| Petroleum.....      | 8,273,815 bbls.     | 8,961,642    |
| Quicksilver.....    | 634 flasks          | 51,140       |
| Unapportioned*..... |                     | 1,367,702    |
| Total value.....    |                     | \$10,709,056 |

\* Includes bituminous rock, brick and hollow building-tile, chromite, diatomite, marble (limestone used for building), mineral water, miscellaneous stone.

### SANTA CLARA

*Land area:* 1328 square miles.

*Population:* 144,921 (1930 census).

*Location:* West-central portion of State.

*County seat:* San Jose.

*References:* State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX.

Santa Clara County reported a mineral output for 1937 of \$722,903, as compared with the 1936 figure of \$675,188.

In thirty-second place with nine mineral substances, commercial production for 1937 was as follows:

| Substance                | Amount      | Value     |
|--------------------------|-------------|-----------|
| Brick.....               | 22,658 M    | \$219,087 |
| Clay.....                | 3,182 tons  | 5,560     |
| Limestone (shells).....  | 39,379 tons | 74,041    |
| Miscellaneous stone..... |             | 262,916   |
| Unapportioned*.....      |             | 161,299   |
| Total value.....         |             | \$722,903 |

\* Includes gems, magnesite, petroleum, quicksilver.

### SANTA CRUZ

*Land area:* 435 square miles.

*Population:* 37,405 (1930 census).

*Location:* Bordering Pacific Ocean, just south of San Mateo County.

*County seat:* Santa Cruz.

*References:* State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of Santa Cruz County, a portion of which is itemized below, amounted to a total of \$2,074,463 for 1937, giving

the county a standing of twenty-first among all others in the State in this regard. The 1936 figure was \$2,103,122.

Commercial production for 1937 was as follows:

| Substance      | Amount      | Value       |
|----------------|-------------|-------------|
| Limestone      | 13,043 tons | \$45,754    |
| Unapportioned* |             | 2,028,709   |
| Total value    |             | \$2,074,463 |

\* Includes bituminous rock, cement, lime, miscellaneous stone.

### SHASTA

*Land area:* 3858 square miles.

*Population:* 13,925 (1930 census).

*Location:* North-central portion of State.

*County seat:* Redding.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX.

Shasta County stood twentieth in California among the mineral-producing counties in 1937, with an output valued at \$2,199,423, as compared with the 1936 production worth \$1,699,902.

With eight mineral substances, commercial production for 1937 was as follows:

| Substance           | Amount           | Value       |
|---------------------|------------------|-------------|
| Copper              | 88,985 lbs.      | \$10,767    |
| Gold                |                  | 1,773,275   |
| Platinum metals     | 193 ozs.         | 9,051       |
| Silver              | 39,801 fine ozs. | 30,786      |
| Miscellaneous stone |                  | 108,039     |
| Other minerals      |                  | 267,505     |
| Total value         |                  | \$2,199,423 |

### SIERRA

*Land area:* 923 square miles.

*Population:* 2419 (1930 census).

*Location:* Eastern border of State just north of Nevada County.

*County seat:* Downieville.

*References:* State Mineralogist report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI.

Sierra County reported a mineral production of \$974,680 in 1937 which was mainly gold, as compared with the 1936 output worth \$787,634.

In twenty-ninth place, commercial production for 1937 was as follows:

| Substance           | Amount          | Value     |
|---------------------|-----------------|-----------|
| Copper.....         | 1,213 lbs.      | \$146     |
| Gold.....           | 934,570         |           |
| Silver.....         | 5,002 fine ozs. | 3,869     |
| Miscellaneous.....  |                 | 36,092    |
| Other minerals..... |                 | 3         |
| Total value.....    |                 | \$974,680 |

### SISKIYOU

*Land area:* 6256 square miles.

*Population:* 25,505 (1930 census).

*Location:* Extreme north-central portion of State, next to Oregon boundary.

*County seat:* Yreka.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935).

Siskiyou, fifth county in California in regard to size, located in highly mineralized and mountainous country, ranks twenty-seventh in regard to mineral output with eleven mineral substances for 1937. The 1936 production was valued at \$831,103.

Commercial production for 1937 was as follows:

| Substance                | Amount          | Value       |
|--------------------------|-----------------|-------------|
| Copper.....              | 1,186 lbs.      | \$144       |
| Gold.....                | 1,055,600       |             |
| Silver.....              | 4,421 fine ozs. | 3,420       |
| Miscellaneous stone..... |                 | 103,519     |
| Unapportioned.....       |                 | 37,668      |
| Total value.....         |                 | \$1,200,351 |

\* Includes lead, gems (rhodonite and Californite), mineral water, pumice, quicksilver, tube-mill pebbles.

### SOLANO

*Land area:* 822 square miles.

*Population:* 40,807 (1930 census).

*Location:* Touching San Francisco Bay on the northeast.

*County seat:* Fairfield.

Solano, while mostly valley land, produced mineral substances during the year 1937 to the total value of \$145,567, ranking it forty-fifth among the counties of the State, compared with the 1936 output worth \$46,552.

Commercial production for 1937 included natural gas, quicksilver, and miscellaneous stone.

**SONOMA***Land area:* 1577 square miles.*Population:* 62,248 (1930 census).*Location:* South of Mendocino County, bordering on the Pacific Ocean.*County seat:* Santa Rosa.*References:* State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926).

Sonoma County ranked forty-third among the counties of California during 1937 with a mineral output valued at \$273,063, as compared with the 1936 figures of \$185,417.

Commercial output during 1937 was as follows:

| Substance                | Amount     | Value     |
|--------------------------|------------|-----------|
| Quicksilver.....         | 281 flasks | \$22,055  |
| Miscellaneous stone..... |            | 235,585   |
| Unapportioned*.....      |            | 15,393    |
| Total value.....         |            | \$273,063 |

\* Includes clay, granite (tuff), lime, mineral water, sandstone.

**STANISLAUS***Land area:* 1450 square miles.*Population:* 56,624 (1930 census).*Location:* Center of State, bounded on south by Merced County.*County seat:* Modesto.*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923 and 1925-1930 by miscellaneous stone. This county for 1937 ranked thirtieth in the State in regard to minerals, with an output valued at \$940,030, as compared with \$691,614 in 1936.

Commercial production for 1937 was as follows:

| Substance                | Amount          | Value     |
|--------------------------|-----------------|-----------|
| Gold.....                |                 | \$603,645 |
| Silver.....              | 1,901 fine ozs. | 1,470     |
| Miscellaneous stone..... |                 | 57,147    |
| Other minerals.....      |                 | 277,768   |
| Total value.....         |                 | \$940,030 |

**SUTTER***Land area:* 608 square miles.*Population:* 14,618 (1930 census).*Location:* Bounded by Butte County on the north and Sacramento on the south.*County seat:* Yuba City.*References:* State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral sub-

stance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928, and 1937.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis. During 1937 there was a commercial output of pottery clay, natural gas, and miscellaneous stone, having a total value of \$22,959.

### TEHAMA

*Land area:* 2893 miles.

*Population:* 13,839 (1930 census).

*Location:* North-central portion of the State, bounded on the north by Shasta.

*County seat:* Red Bluff.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXIV (July, 1928).

Tehama County stood fifty-first among the mineral-producing counties of the State for 1937, with an output valued at \$65,193, as compared with the 1936 yield worth \$100,403.

Commercial production in 1937 included miscellaneous stone.

### TRINITY

*Land area:* 3166 square miles.

*Population:* 2811 (1930 census).

*Location:* Northwestern portion of State.

*County seat:* Weaverville.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX.

Trinity County's 1937 output of minerals was valued at \$721,290 as compared with the 1936 figure of \$724,109, mainly due to gold which gives the county a rank of thirty-third for the year.

Commercial production for 1937 was as follows:

| Substance       | Amount          | Value     |
|-----------------|-----------------|-----------|
| Gold            |                 | \$703,780 |
| Platinum metals | 155 ozs.        | 7,052     |
| Silver          | 2,713 fine ozs. | 2,099     |
| Unapportioned*  |                 | 8,359     |
| Total value     |                 | \$721,290 |

\* Includes coal, quicksilver, miscellaneous stone.

### TULARE

*Land area:* 4856 square miles.

*Population:* 77,375 (1930 census).

*Location:* Bounded by Inyo on the east, Kern on the south, Fresno on the north.

*County seat:* Visalia.

*References:* State Mineralogist Report XV : XVII : XVIII : XX.

Tulare County stands forty-first on the list of mineral producing counties for 1937, with ten different mineral substances, having a total value of \$314,952, as compared with the 1936 figures of \$209,968.

Commercial production for 1937 was as follows:

| Substance                | Amount       | Value            |
|--------------------------|--------------|------------------|
| Gold.....                |              | \$1,050          |
| Silver.....              | 12 fine ozs. | 9                |
| Miscellaneous stone..... |              | 136,539          |
| Unapportioned*.....      |              | 177,354          |
| <b>Total value.....</b>  |              | <b>\$314,952</b> |

\* Includes brick and hollow building-tile, chromite, gems (Californite), natural gas, petroleum, tungsten ore.

### TUOLUMNE

*Land area:* 2190 square miles.

*Population:* 9239 (1930 census).

*Location:* East-central portion of State—Mother Lode District.

*County seat:* Sonora.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928).

Tuolumne County ranks twenty-eighth among the counties of the State relative to its total value of mineral output for 1937 with ten different substances. This county ranks first as a producer of marble in the State. The mineral production for 1937 was valued at \$1,012,180, as compared with \$723,469 for 1936.

Commercial production for 1937 was as follows:

| Substance                | Amount          | Value              |
|--------------------------|-----------------|--------------------|
| Copper.....              |                 | \$745              |
| Gold.....                | 6,157 lbs.      | 690,555            |
| Silver.....              | 7,975 fine ozs. | 6,155              |
| Miscellaneous stone..... |                 | 130,747            |
| Unapportioned*.....      |                 | 183,948            |
| <b>Total value.....</b>  |                 | <b>\$1,012,180</b> |

\* Includes lead, lime, limestone, marble, slate.

### VENTURA

*Land area:* 1878 square miles.

*Population:* 54,577 (1930 census).

*Location:* Southwestern portion of State, bordering on Pacific Ocean.

*County seat:* Ventura.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXI : XXVIII (July-Oct., 1932).

Ventura is fifth in the State in respect to the value of its mineral output for 1937. The 1937 mineral production was worth \$19,230,720, as compared with the 1936 output valued at \$17,631,880.

With eight different mineral substances, commercial production for 1937 was as follows:

| Substance           | Amount               | Value        |
|---------------------|----------------------|--------------|
| Gold                |                      | \$1,295      |
| Natural gas         | 44,102,839 M cu. ft. | 1,457,709    |
| Petroleum           | 16,720,713 bbls.     | 17,562,688   |
| Silver              | 2 fine ozs.          | 2            |
| Miscellaneous stone |                      | 200,861      |
| Unapportioned*      |                      | 8,165        |
| Total value         |                      | \$19,230,720 |

\* Includes clay (oil-well drilling-mud), granite (volcanic rock).

### YOLO

*Land area:* 1017 square miles.

*Population:* 23,618 (1930 census).

*Location:* Sacramento Valley, bounded by Sutter on the east and Colusa on the north.

*County seat:* Woodland.

*References:* State Mineralogist Report XIV : XVII : XVIII.

Yolo County in fifty-second place had a commercial production for 1937 as follows, compared with \$71,609 the preceding year:

| Substance           | Amount      | Value    |
|---------------------|-------------|----------|
| Gold                |             | \$1,330  |
| Silver              | 5 fine ozs. | 4        |
| Miscellaneous stone |             | 40,765   |
| Other minerals      |             | 2,072    |
| Total value         |             | \$44,171 |

### YUBA

*Land area:* 639 square miles.

*Population:* 11,327 (1930 census).

*Location:* Lies west of Sierra and Nevada counties; south of Plumas.

*County seat:* Marysville.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked fifteenth among the counties of the State as a mineral producer and fourth in respect to gold, which is obtained mainly by dredges. The 1936 output was valued at \$2,893,823.

Commercial production for 1937 was as follows:

| Substance           | Amount          | Value       |
|---------------------|-----------------|-------------|
| Gold                |                 | \$2,495,115 |
| Silver              | 4,740 fine ozs. | 3,666       |
| Miscellaneous stone |                 | 85,695      |
| Other minerals      |                 | 2,272       |
| Total value         |                 | \$2,587,748 |

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## CHAPTER VIII

### DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA 1937

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NOTE.—The producers of natural gas and petroleum will be found in the Quarterly Summary of Operations, California Oil Fields, for July, August and September, 1937 (Vol. 23, No. 1).

## BARYTES

| Operator  | Address  | Location of mine       |
|---|--|------------------------|
| <i>Mari</i> posa County<br>California Barite Corp., E. S. McCurdy -<br>National Pigments Co.----- | 10 Penthouse, Mills Bldg., San Francisco<br>Russ Bldg., San Francisco----- | El Portal<br>El Portal |

## BENTONITE (FULLER'S EARTH)

| Operator  | Address  | Location of pit                  |
|---|--|----------------------------------|
| <i>Inyo County</i><br>Chamberlain Co., Inc.-----  | 2550 E. 9th St., Los Angeles-----  | Olancha                          |
| <i>San Benito County</i><br>D. L. Stewart Property, A. P. Stewart, Lessee-----  | 1052 Vermont St., San Jose-----  | Tres Pinos                       |
| <i>San Bernardino County</i><br>Walter Becker<br>Chamberlain Co., Inc.<br>National Lead Co., National Pigments & Chemical Div.----- | Box 42, Red Mountain-----<br>2550 E. 9th St., Los Angeles-----<br>983 Wilson, Los Angeles----- | Red Mountain<br>Hector<br>Hector |

## BITUMINOUS ROCK

| Operator  | Address                              | Location of mine |
|---|--------------------------------------|------------------|
| <i>Santa Barbara County</i><br>Higgins Quarry, D. A. Sattler, Lessee----- | 856 Arguello Rd., Santa Barbara----- | Carpinteria      |
| <i>Santa Cruz County</i><br>Calrock Asphalt Co.-----                      | 525 Market St., San Francisco-----   | Majors           |

| BORATES  |  |                              |                         |
|--|--|------------------------------|-------------------------|
| Operator   |  | Address                      | Location of mine        |
| <i>Inyo County</i><br>Pacific Alkali Co.                           | 1909 Pacific Mutual Bldg., Los Angeles | 510 W. 6th St., Los Angeles  | Bartlett<br>Los Angeles |
| United States Borax Co.  |  |                              |                         |
| <i>Kern County</i><br>Pacific Coast Borax Co.                      | 510 W. 6th St., Los Angeles            |                              | Kramer                  |
| <i>San Bernardino County</i><br>American Potash and Chemical Corp. | Trona                                  | Latham Square Bldg., Oakland | Searles Lake            |
| West End Chemical Co.  |  |                              |                         |

| BROMINE  |        |         |                  |
|--|--------|---------|------------------|
| Operator   |        | Address | Location of mine |
| <i>Alameda County</i><br>Westvaco Chlorine Prod. Corp.   | Newark |         | Newark           |
| <i>San Diego County</i><br>Westvaco Chlorine Prod. Corp. | Newark |         | San Diego        |

| CALCIUM CHLORIDE   |                              |                                   |                  |
|--|------------------------------|-----------------------------------|------------------|
| Operator   |                              | Address                           | Location of mine |
| <i>San Bernardino County</i><br>California Rock Salt Co. | 2465 Hunter St., Los Angeles | 200 S. Santa Fe Ave., Los Angeles | Amboy            |
| Hollar Chemical, Inc.                                    |                              |                                   | Furnston         |

## CARBON DIOXIDE GAS

| Operator  | Address          | Location of wells |
|---|------------------|-------------------|
| <i>Imperial County</i><br>National Dry Ice Co.,<br>Pacific-Imperial Dri-Ice, Inc., Carl M. Einhart, Pres. | Niland<br>Niland | Niland<br>Niland  |
|   |                  |                   |

## CEMENT

| Operator  | Address   | Location of mill      |
|---|---|-----------------------|
| <i>Calaveras County</i><br>Calaveras Cement Co.   | 315 Montgomery St., San Francisco                                 | San Andreas           |
| <i>Contra Costa County</i><br>Henry Cowell Lime and Cement Co.                                      | 2 Market St., San Francisco                                       | Cowell                |
| <i>Kern County</i><br>Monolith Portland Cement Co.  | Bartlett Bldg., Los Angeles                                       | Monolith              |
| <i>Los Angeles County</i><br>Blue Diamond Corp.   | 1650 S. Alameda St., Los Angeles                                  | Los Angeles           |
| <i>Merced County</i><br>Yosemite Portland Cement Co.  | Merced  | Merced                |
| <i>Riverside County</i><br>Riverside Cement Co.   | 621 S. Hope St., Los Angeles                                      | Riverside             |
| <i>San Bernardino County</i><br>California Portland Cement Co.,<br>Southwestern Portland Cement Co. | 601 W. Fifth St., Los Angeles<br>503 Roosevelt Bldg., Los Angeles | Colton<br>Victorville |
| <i>San Mateo County</i><br>Pacific Portland Cement Co.  | 111 Sutter St., San Francisco                                     | Redwood City          |
| <i>Santa Cruz County</i><br>Santa Cruz Portland Cement Co.  | Crocker Bldg., San Francisco                                      | Davenport             |

| CHROMITE   |       |   |  |
|--|-------|---|--|
| Operator   |       | Address   | Location of mine                           |
| <i>Del Norte County</i><br>Gordon Mountain Group, Clifford D. Fies<br>High Plateau Group, Eugene Brown | ..... | 1441 Riverside Dr., Roseburg, Oregon<br>O'Brien, Oregon | Low Divide District<br>Low Divide District |
| <i>El Dorado County</i><br>U. S. Chrome Mines, Inc., Alwyn H. Wild                                     | ..... | 2240 Hyde St., San Francisco                            | Folsom                                     |
| <i>Fresno County</i><br>Bradley & Ekstrom  | ..... | 320 Market St., San Francisco                           | Tollhouse                                  |
| <i>Santa Barbara County</i><br>Ernest D. Boaz  | ..... | 23 Arlington Ave., Santa Barbara                        | Los Olivos                                 |
| <i>Tulare County</i><br>Janoko Bros.   | ..... | R.F.D. 1, Box 688, Porterville                          | Porterville                                |

## (Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

| Operator  | Remarks | Address                                    | Location of plant or pit |
|---|---------|--|--------------------------|
| Alameda County  |         |  |                          |
| California Pottery Co.                                    | a, c    | Niles                                      | Niles                    |
| N. Clark & Sons   | a, b    | 116 Natomas St., San Francisco             | Alameda                  |
| Electrical Porcelain Works                                | a       | 1289 Cedar St., Berkeley                   | Berkeley                 |
| Interlocking Tile Co.                                     | a, c    | Niles                                      | Niles                    |
| Krafftile Co.   | a, b    | Niles                                      | Niles                    |
| M. & S. Tile Co.  | a, c    | Decoto                                     | Decoto                   |
| F. R. Stuve   | a       | 420 Kains Ave., Albany via Berkeley        | Eden                     |
| Technical Porcelain and China Ware Co.                    | a       | 1285 Hearst Ave., Berkeley                 | Albany                   |
| Walrich Pottery   | a       | 62d and Green Sts., Emeryville             | Emeryville               |
| Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Works | a       | 1315 2d St., Berkeley                      | Berkeley                 |
| Woolenius Tiles & Mantles                                 | a       |  |                          |
| Amador County   |         |  |                          |
| M. J. Bacon   | c       | Ione                                       | Carbondale               |
| Cal. Mineral Products Co., Ione Clay and Sand Pit         | c, f    | Kohl Bldg., San Francisco                  | Ione                     |
| N. Clark & Sons   | c       | 116 Natomas St., San Francisco             | Ione                     |
| Clay Corp. of California                                  | c       | 1267 Russ Bldg., San Francisco             | Ione                     |
| Ione Fire Brick Co., J. T. Roberts, Mgr.                  | b       | 1267 Russ Bldg., San Francisco             | Ione                     |
| Preston School of Industry                                | b       | Ione                                       | Ione                     |
| Calaveras County  |         |  |                          |
| California Pottery Co.                                    | c       | Niles                                      | Valley Springs           |
| Contra Costa County                                       |         |  |                          |
| California Art Tile Corp.                                 | a       | Box 1116, Richmond                         | Richmond                 |
| Old Mission Tile Co.                                      | a, c    | 120th St., Richmond                        | San Pablo                |
| Port Costa Brick Works, C. G. Berg, Pres.                 | b       | 6th and Berry Sts., San Francisco          | Port Costa               |
| Ed. Roberts   | c, f    | Pittsburgh                                 | Pittsburgh               |
| Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.           | a       | Box W, Richmond                            | Richmond                 |
| Stockton Fire Brick Co.                                   | a, b    | Russ Bldg., San Francisco                  | Pittsburgh               |
| United Materials & Richmond Brick Co., Ltd.               | b, c    | Box 7, Richmond                            | Richmond                 |
| Fresno County   |         |  |                          |
| Craycroft Brick Co.                                       | a, b    | Griffith-McKenzie Bldg., Fresno            | Fresno                   |
| Humboldt County   |         |  |                          |
| D. J. Thompson Brick Co.                                  | a, b, c | Box 16, Myrtle Ave., Eureka                | Eureka                   |
| Imperial County   |         |  |                          |
| McKnight Clay Deposit, J. H. McKnight                     | c       | Hotel Barclay, 103 W. 4th St., Los Angeles | Glamis                   |
| Inyo County   |         |  |                          |
| Chamberlain Co., Inc.                                     | e       | 2550 E. 9th St., Los Angeles               | Olancha                  |

|   |         |  |  |
|---|---------|--|--|
| <i>Kern County</i>                                    |         |  |  |
| American Minerals Co.                                 | e       |  |  |
| Bakersfield Sandstone Brick Co., James Curran, Mgr.   | b       |  |  |
| C. W. Hartman   | d       |  |  |
| King Lumber Co.                                       | b       |  |  |
| Mojave Corp.  | d       |  |  |
| <i>Los Angeles County</i>                             |         |  |  |
| Alhambra Kilns, Inc., L. C. Merwin                    | a       |  |  |
| American Refractories Co.                             | a, b    |  |  |
| Angulo Tile Co., L. H. and W. H. Angulo               | a       |  |  |
| B. W. Tile Co.  | a, c    |  |  |
| J. A. Bauer Pottery Co.                               | a       |  |  |
| J. Booth  | a       |  |  |
| Builders Brick Co., Ltd.                              | a, c    |  |  |
| Ceramic Corp.   | b       |  |  |
| City Brick Co.  | b       |  |  |
| Claycroft Potteries, Fred H. Robertson                | a       |  |  |
| H. F. Coors Co., Inc.                                 | a       |  |  |
| Davidson Brick Co.                                    | b, c    |  |  |
| Elmer California Co.                                  | a       |  |  |
| Enisco Refractories Co.                               | a, b    |  |  |
| Gladding, McBean & Co., Tropico, L. A. & S. M. Plants | a, b, c |  |  |
| Ha-Jo Tile & Pottery Co.                              | a       |  |  |
| Higgins Brick & Tile Works, James R. Higgins          | a, b, c |  |  |
| Italian Terra Cotta Co., Inc., H. A. Hayner, Mgr.     | a       |  |  |
| Long Beach Brick Co., Inc.                            | b       |  |  |
| Markoff Mosaic Tile Corp.                             | b       |  |  |
| Myers Pottery Co.                                     | a       |  |  |
| Pacific Clay Products                                 | a, b, c |  |  |
| Pacific Tile & Porcelain Co.                          | a       |  |  |
| Pomona Brick Co., Wm. McMullen, Mgr.                  | b       |  |  |
| Pomona Tile Mfg. Co.                                  | b       |  |  |
| San Valley Tile Kilns, R. F. Stuiver, Mgr.            | a, c    |  |  |
| San Catalina Island Co., Wm. Wright, Jr.              | a, c    |  |  |
| St. Louis Fire Brick and Clay, Joseph Meesmer         | b       |  |  |
| Tillotson Clay Products                               | b       |  |  |
| Vernon Potteries                                      | a, b    |  |  |
| Vitrifrax Co.   | a, b, c |  |  |
| <i>Marin County</i>                                   |         |  |  |
| McNear Brick Co.                                      | a, b    |  |  |
| McNear Point, San Rafael                              |         |  |  |

well drilling-mud. e. Filtering clay. f. Fire sand.

MENTAL I ORGAN, DALLAS MEDICAL CENTER

20

### Clay products.

CLAY—1937  
(*Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.*)

| Operator  | Remarks  | Address   | Location of plant or pit   |
|---|--|---|--|
| <i>Monterey County</i><br>Castroville Clay Prod. Co.,--   | a, c   | Castroville,--  | Castroville  |
| <i>Orange County</i><br>Arnold Clay Mine, I. P. Arnold<br>Gladding, McBean & Co.,--<br>La Balsa Tile Co., A. W. Griffith<br>Mission Clay Products Co.,--<br>Tierra Colorada Clay Co.,--   | c, f<br>c<br>a, c<br>a, b, c<br>c              | 1846 W. 83d St., Los Angeles<br>2901 Los Feliz Blvd., Los Angeles<br>R.F.D. 1, Box 174, Huntington Beach<br>Olive<br>Box 473, San Juan Capistrano   | El Toro<br>Gypsum<br>Smeltizer<br>Olive<br>San Juan Capistrano   |
| <i>Placer County</i><br>Clay Corp. of Calif.<br>Gladding, McBean & Co.,--<br>Lincoln Clay Products Co., M. J. Dillman, Mgr.,--  | a, b, c<br>c<br>c                              | 1267 Russ Blvd., San Francisco<br>2301 Los Feliz Blvd., Los Angeles<br>Lincoln  | Lincoln<br>Lincoln<br>Lincoln  |
| <i>Riverside County</i><br>Alberhill Coal and Clay Co.<br>C. R. Freeman<br>Los Angeles Brick Co.,--<br>Pacific Clay Products<br>Temescal Clay Co.,--  | c<br>c<br>a, b, c<br>c<br>c                    | 2406 E. 58th St., Los Angeles<br>Courthouse, Riverside<br>1078 Mission Rd., Los Angeles<br>650 Chamber of Commerce Bldg., Los Angeles<br>5601 S. Boyle Ave., Los Angeles  | Alberhill<br>Corona<br>Alberhill<br>Corona<br>Temescal   |
| <i>Sacramento County</i><br>Cannon & Co.<br>H. C. Muddox, Jessie E. Muddox, Owner<br>Panama Pottery Co.,--<br>Sacramento Brick Co.,--<br>Valley Brick Co.,--  | a, b<br>a<br>a<br>b<br>b                       | Box 802, Sacramento<br>30th and I Sts., Sacramento<br>R.F.D. 4, Box 1478, 24th St. Rd., Sacramento<br>1400 Front St., Sacramento<br>Box 1180, Sacramento  | Ben Ali<br>Sacramento<br>Sacramento<br>Sacramento<br>Sacramento  |
| <i>San Benito County</i><br>D. L. Stewart Property, A. P. Stewart, Lessee   | e  | 1052 Vermont, San Jose  | Tres Pinos   |
| <i>San Bernardino County</i><br>Mr. Walter Becker<br>Chamberlain Co., Inc.,--<br>Hancock Brick Yard, C. P. Hancock & Son<br>Hart Clay Co., W. K. Skeoch, Lessor<br>William M. Henson<br>Kennedy Clay Pit, John Kennedy<br>National Lead Co., Pigments & Chemical Div.,--<br>Pacific Coast Talc Co.,--<br>Standard Sanitary Mfg. Co., Pacific Mines, P. R. Jones, Mgr.<br>J. H. Stone,--<br>Temescal Clay Co.,-- | e<br>e<br>b<br>c<br>c<br>c<br>e<br>e<br>e<br>d | Box 43, Red Mountain<br>2250 E. 9th St., Los Angeles<br>4530 Lemon St., Riverside<br>2022 Thayer Ave., Los Angeles<br>Box 336, Oro Grande<br>1806½ Warren Ave., Los Angeles<br>2149 Bay St., Los Angeles<br>Campbell<br>Barstow<br>5601 S. Boyle Ave., Vernon | Red Mountain<br>Olaracha<br>Highgrove<br>Goffs<br>Oro Grande<br>Daggett<br>Hector<br>Silver Lake<br>Hart<br>Barstow<br>Hicks |

|   |         |                                      |
|---|---------|--------------------------------------|
| <i>San Diego County</i>                       |         | Farr Station                         |
| Pacific Clay Products Co.                     | c       | Box 145, Station A, Los Angeles.     |
| Union Brick Co., J. W. Rice.                  | a, b, c | 2865 3d St., North San Diego.        |
| Wittrifed Products Corp.                      |         | 2841 Jefferson St., North San Diego. |
| <i>San Joaquin County</i>                     |         |                                      |
| San Joaquin Brick Co., J. F. Stein, Secretary | b       | 33, S. El Dorado St., Stockton.      |
| Stockton Brick & Tile Co.                     | c       | McKinley Ave., Stockton.             |
| <i>San Luis Obispo County</i>                 |         |                                      |
| Antelope Mud Co., W. G. Angus, Mgr.           | d       | Box 204, Lost Hills.                 |
| San Luis Brick Works, Paulstick Bros.         | b, d    | San Luis Obispo.                     |
| <i>San Mateo County</i>                       |         |                                      |
| Richmond Potteries, Inc.                      | a       | Box 187, South San Francisco.        |
| <i>Santa Barbara County</i>                   |         |                                      |
| McNall Building Materials                     | a, b, c | 208 N. Salisipuedes, Santa Barbara.  |
| Parker Brick Co., J. Y. Parker                | a, b    | 303 Ladera St., Santa Barbara.       |
| <i>Santa Clara County</i>                     |         |                                      |
| Coyote Creek Clay Beds, L. R. Lenfest         | c       | 1195 E. Santa Clara St., San Jose.   |
| Garden City Pottery                           | a       | 560 N. 6th St., San Jose.            |
| Gladding Bros. Mfg. Co.                       | a, b, c | S. 3d and Keyes Sts., San Jose.      |
| Hankcraft Tile Co., L. W. Austin et al.       | a       | R.F.D. 2, Box 121A, San Jose.        |
| Myers Ceramic Pottery, A. Clay Myer           | a       | Box 97, Santa Clara.                 |
| Remillard Brick Co.                           | b       | 569 31 St., Oakland.                 |
| San Jose Brick Co.                            | b, c    | Box 274, San Jose.                   |
| S. & L. Tile Co.                              | a       | 1881 S. 1st St., San Jose.           |
| <i>Sonoma County</i>                          |         |                                      |
| Baltane Clay Deposit, Harry Weise             | c       | Glen Ellen.                          |
| Clay Corp. of Calif.                          | c       | 1267 Russ Blvd., San Francisco.      |
| <i>Stanislaus County</i>                      |         |                                      |
| Cooperstown Clay Deposit, J. H. Hornsby       | c       | 651 Cumberland St., Pittsburg.       |
| <i>Sutter County</i>                          |         |                                      |
| Gladding, McBean & Co.                        | c       | 2901 Los Feliz Blvd., Los Angeles.   |
| <i>Tulare County</i>                          |         |                                      |
| San Joaquin Materials Co.                     | b       | 744 G St., Fresno.                   |
| <i>Ventura County</i>                         |         |                                      |
| Robert Fraser                                 | d       | Ventura.                             |
| Hercules Rotary Mud Co., Salby Shale Fit      | d       | 2000 N. Ventura Ave., Ventura.       |
| Peoples Lumber Co., C. E. Bonestel, Mgr.      | a, b, c | N. Ventura Ave., Ventura.            |
| Shell Oil Co., Dent Clay Pk.                  | d       | Shell Blvd., San Francisco.          |

\* Plant destroyed by fire.  
 a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Ganister.

## COAL

| Operator   | Remarks | Address                        | Location of mine |
|--|---------|--------------------------------|------------------|
| <i>Amador County</i><br>Buena Vista Coal Mine, Fred Harkness & Sons----- |         | R.F.D. 1, Box 60, Ione-----    | Buena Vista      |
| <i>San Benito County</i><br>M & R Coal Mine-----                         |         | R.F.D. 1, Box 81, Salinas----- | San Benito       |
| <i>Trinity County</i><br>Tom Reese-----                                  |         | Douglas City-----              | Douglas City     |

## COPPER

## Principal Copper Producers in California during 1937

| Mine   | Operator                          | Address                                     | Location of mine |
|--|-----------------------------------|---|------------------|
| <i>El Dorado County</i><br>Big Canyon-----     | The Mountain Copper Co., Ltd----- | 351 California St., San Francisco-----      | Shingle Springs  |
| <i>Imperial County</i><br>American Girl-----   | Socorro Mines, Inc.-----          | Box 12, Ogilby-----                         | Ogilby           |
| <i>Inyo County</i><br>Cardinal-----            | Cardinal Gold Mining Co.-----     | Bishop-----                                 | Bishop           |
| <i>Mono County</i><br>Silverado & Kentuck----- | Sierra Cons. Mines, Inc.-----     | Wellington, Nevada-----                     | Sweetwater, Nev. |
| <i>Nevada County</i><br>Empire Star Group----- | Empire Star Mines Co., Ltd-----   | 14 Wall St., Rm. 1507, New York, N. Y.----- | Grass Valley     |
| Lava Cap-----                                  | Lava Cap Gold Mining Corp.-----   | Box 750, Nevada City-----                   | Nevada City      |
| Spanish-----                                   | Bradley Mining Co.-----           | Crocker Bldg., San Francisco-----           | Washington       |
| <i>Plumas County</i><br>Walker-----            | Walker Mining Co.-----            | 821 Kearns Bldg., Salt Lake City, Utah----- | Walker mine      |
| <i>San Bernardino County</i><br>Kelly-----     | Frank Royer-----                  | Red Mountain-----                           | Red Mountain     |

## DIATOMITE (DIATOMACEOUS EARTH)

| Operator  | Address                                  | Location of quarry or mine |
|---|--|----------------------------|
| <i>Los Angeles County</i><br>The Dicalite Co.<br>Diatomaceous Earth Corp.                     | 756 S. Broadway, Los Angeles<br>Walteria | San Pedro<br>Walteria      |
| <i>Monterey County</i><br>Pacatomie, Ltd.   | Bradley                                  | Bradley                    |
| <i>Santa Barbara County</i><br>Johns-Mansville Products Corp.<br>Lompoc Mining Products, Inc. | Lompoc<br>Lompoc                         | Lompoc<br>Lompoc           |

## DOLOMITE

| Operator   | Address  | Location of quarry |
|--|--|--------------------|
| <i>Inyo County</i><br>Inyo Marble Co.                                      | 726-732 E. 29th St., Los Angeles                 | Keeler             |
| <i>Los Angeles County</i><br>W. F. Glasser, Inc.                           | 713 N. Sepulveda, Brentwood Heights, Los Angeles | Bel-Air            |
| <i>Monterey County</i><br>Pacific Coast Steel Corp., Sterling Ranch Quarry | 20th and Illinois Sts., San Francisco            | Natividad          |
| <i>San Benito County</i><br>Archie E. Hamilton                             | Hollister  | Hollister          |

## FIELDSPAR

| Operator   | Address                               | Location of mine |
|--|---------------------------------------|------------------|
| <i>Fresno County</i><br>Industrial Minerals & Chemical Co.   | 836 Gilman St., Berkeley              | Friant           |
| <i>San Diego County</i><br>Ames Grinding Co., Geo. Ames<br>Standard Sanitary Mfg. Co., P. R. Jones, Mgr. | 2030 E. 53d St., Los Angeles<br>Campo | Campo            |

## FLUORSPAR

| Operator                                       | Address                      | Location of quarry or mine |
|--|------------------------------|----------------------------|
| <i>San Bernardino County</i><br>C. J. Whitlock | 937 25th St., San Bernardino | Afton                      |

## GEMS

| Operator   | Variety  | Address   |
|--|--|---|
| W. C. Eyles<br>Robert J. Graham<br>H. F. Heather<br>Pala Chief Mine, Margaret S. Moore and M. Wear | Obicular and brecciated jasper and prase opal<br>Iridescent obsidian<br>Iceland-spar<br>Tourmaline | 2025 Foothill Blvd., Oakland<br>Davis Creek<br>236 Oak Knoll Ave., Pasadena<br>Box 38, Pala |

## GOLD

Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937

| Mine                        | Type of mine | Operator  | Address                                 | Location of mine     |
|-----------------------------|--------------|---|---|----------------------|
| <i>Alpine County</i>        |              |   |   |                      |
| Zaca                        | 1            | Zaca Mining Corporation                             | Markleeville                            | Markleeville         |
| <i>Amador County</i>        |              |   |   |                      |
| Argonaut                    | a            | Argonaut Mining Co., Ltd.                           | 1404 Humboldt Bank Bldg., San Francisco | Jackson              |
| Arroyo Seco                 | a            | Arroyo Seco Gold Dredging Co.                       | 351 California St., San Francisco       | Jone                 |
| Belden Amador               | a            | Belden Amador Mines, Inc.                           | Pine Grove                              | Pine Grove           |
| Black Metal                 | a            | Black Metal Mines Co.                               | Jackson                                 | Jackson              |
| Central Eureka & Old Eureka | a            | Central Eureka Mining Co.                           | 111 Sutter St., San Francisco           | Sutter Creek         |
| Central Eureka Dump         | a            | Central Tailings Co.                                | 564 Market St., San Francisco           | Sutter Creek         |
| Comanche Dredge             | e            | Comanche Gold Dredging Co.                          | 311 California St., San Francisco       | Comanche             |
| Delta Tailings              | c            | Delta Tailings Co.                                  | 564 Market St., San Francisco           | Jone                 |
| Joe Porres                  | a            | Joe Porres  | Jackson                                 | Jackson              |
| J. C. Ninnmo & F. W. Kent   | a            | J. C. Ninnmo & F. W. Kent                           | Volcano                                 | Volcano              |
| Fremont-Grover              | a            | Fremont-Grover Co., and Amador Mother Lode Min. Co. | Jackson                                 | Drytown              |
| Fuller                      | a            | John J. Bernich & G. F. Fuller                      | Jackson                                 | Jackson              |
| H. G. Kretsch               | g            | H. G. Kretsch                                       | 519 California St., San Francisco       | Jone                 |
| Kennedy                     | a            | Kennedy Mining & Milling Co.                        | 2567 38th Ave., Oakland                 | Marcell              |
| Lancha Plana                | e            | Lancha Plana Gold Dredging Co.                      | Sutter Creek                            | Comanche             |
| McCullough Tailings         | c            | Ernest G. Runup                                     | Amador City                             | Oroville             |
| Mother Lode                 | a            | Mother Lode Gold Mines, Inc.                        | Elwood, Orr                             | Plymouth             |
| Original Amador             | a            | Original Amador Gold Mines                          | River Pine                              | Plymouth             |
| Plymouth                    | a            |   | 618 3d St., San Rafael                  | Jackson              |
| River Pine                  | h            | River Pine Mining Co.                               | Elk Grove                               | Elk Grove            |
| Valpariso                   | a            | Valpariso Mining Co.                                | Wolin-Hall & Wackman                    | Wolin-Hall & Wackman |
| Wolin-Hall-Wackman          | h            |   |   |                      |
| <i>Butte County</i>         |              |   |   |                      |
| Briggs                      | e            | Yuba Consolidated Gold Fields                       | 351 California St., San Francisco       | Rio Bonito           |
| Coleman Property            | h            | Chas. Coleman & A. L. Schneider                     | Chico                                   | Chico                |
| Daggeritt Land              | h            | Chico Miners Co.                                    | Wyandotte                               | Wyandotte            |
| Consuelo                    | k            | Max Hoffman   | Box 212, Oroville                       | Oroville             |
| Four L                      | a            | A. J. Lindsey                                       | Oroville                                | Oroville             |
| Granella Ranch              | h            | Penn Dredging Co., A. B. Inmis                      | 1620 Bird St., Oroville                 | Oroville             |
| McCoy Ranch                 | e            | Bill McCoy Dredging Co.                             | Chico                                   | Chico                |
| Midas (Forbestown)          | a            | Idaho Maryland Mines Corp.                          | Forbestown                              | Oroville             |
| Bichter & Sons Gold Dredge  | h            | Wm. Richter   | Russ Bldg., San Francisco               | Oroville             |
| Riley Estate                | h            | Western Dredging Co.                                | R.F.D. 2, Box 318, Oroville             | Oroville             |
| Roots & Sands Orchard       | h            | Butte Gold Dredging Co.                             | Oroville                                | Oroville             |
| Skinnell Property           | k            | Butte Mfg. & Development Co.                        | Chico                                   | Chico                |
| Surcease                    | a            | Heffling Bros.                                      | 1000 4th St., Sacramento                | Yankee Hill          |
| Swift Property              | h            | Fourells Co.  | Oroville                                | Oroville             |
| Truman Hill                 | e            |   | Oroville                                | Oroville             |

a. Lode gold mine. b. Placer (stuvicing) mines. c. Tailings dumps. d. Power shovel. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-gold mine. j. Silver-gold mine.

## GOLD—Continued

Principal gold producers in California out of a total of 1,761 placer operators and lode mines in 1937

| Mine                      | Type of mine | Operator                         | Address                           | Location of mine |
|---------------------------|--------------|----------------------------------|-----------------------------------|------------------|
| <i>Calaveras County</i>   |              |                                  |                                   |                  |
| Camanche Placers          | e            | Camanche Placers, Ltd.           | Camanche                          | Camanche         |
| Carson Hill               | a            | Carson Hill Gold Mining Corp.    | Melones                           | Melones          |
| Clear Creek               | b            | Milton Gold Dredging Enterprise  | Milton                            | Milton           |
| Easy Bird                 | a            | Lee Po Mines, Inc.               | Jackson                           | Jackson          |
| Esmond & James Properties | e            | Wallace Dredging Co.             | 311 California St., San Francisco | Stockton         |
| Folsom Dredge             | k            | A. R. Folsom                     | 649 S. Olive St., Los Angeles     | Los Angeles      |
| Golden River              | f            | Golden River Mining Co.          | Carmenche                         | Carmenche        |
| Lancha Plana              | e            | Lancha Plana Gold Dredging Co.   | 621 W. Alvarado St., Stockton     | Stockton         |
| Lloyd                     | f            | G. F. Sheckler                   | 506 Bay City Bldg., Santa Monica  | Angels Camp      |
| McKissick                 | a            | Consolidated Mines of Calif.     | 634 S. Spring St., Los Angeles    | Angels Camp      |
| Mother Lode Central       | a            | Mother Lode Central Mines, Inc.  | 1022 Crocker Bldg., San Francisco | Copperopolis     |
| Mountain King             | a            | Jumbo Cons. Mining Co.           | Milton                            | Murphys          |
| Oro y Plata               | a            | Orion Mining Co.                 | California Bldg., Stockton        | Camanche         |
| Royal                     | a            | Frank S. Tower                   | Angels Camp                       | Angels Camp      |
| South Gulch               | h            | E. L. Lilly                      |                                   |                  |
| Vallecito Western         | f            | Vallecito Mining Co., Inc.       |                                   |                  |
| <i>El Dorado County</i>   |              |                                  |                                   |                  |
| Beebe-Alpine              | a            | Bebe Gold Mining Co.             | Georgetown                        | Georgetown       |
| Big Canyon                | a            | The Mountain Copper Co., Ltd.    | Shingle Springs                   | Shingle Springs  |
| Big Canyon Dredge         | h            | Big Canyon Dredge                | Garden Valley                     | Garden Valley    |
| Black Oak                 | a            | Russell J. Wilson                | Pilot Hill                        | Pilot Hill       |
| Boulder                   | a            | Jack Greaves                     | Placerville                       | Placerville      |
| Carpender                 | f            | Placeres do Oro Co.              | Forum Bldg., Sacramento           | Shingle          |
| General Utility           | h            | General Utility Corp.            | 519 California St., San Francisco | Garden Valley    |
| Kelsey                    | a            | Kelsey Mining Co., Inc.          | Lotus                             | Lotus            |
| Lotus                     | k            | R. A. Healy                      | Grizzly Flat                      | Grizzly Flat     |
| Middle End                | a            | Consumes Mines, Inc.             | Auburn                            | Auburn           |
| Rosencranz                | a            | Lode Development Co.             | Folsom                            | Folsom           |
| Ruth Ann                  | h            | Ruth Ann Mine Co., B. F. Modglin | Greenwood                         | Greenwood        |
| Sliger                    | a            | Middle Fork Gold Mining Co.      | Placerville                       | Placerville      |
| Union                     | a            | Montezuma-Apex Mining Co.        | Garden Valley                     | Garden Valley    |
| Veerkamp Ranch            | a            | Gold Company, Ltd.               | Placerville                       | Placerville      |
| Vandalia                  | a            | Page Consolidated Mng. Co.       | Shingle Springs                   | Shingle Springs  |
| <i>Humboldt County</i>    |              |                                  |                                   |                  |
| Pearch                    | g            | Roy McGaugh                      | Orleans                           | Orleans          |
| <i>Imperial County</i>    |              |                                  |                                   |                  |
| American Girl             | a            | Socorro Mines, Inc.              | Box 12, Ogilby                    | Ogilby           |
| Cargo Muchacho Group      | a            | Holmes & Nicholson               | Yuma, Arizona                     | Ogilby           |
| Sovereign Group           |              | Sovereign Development Co.        | Ogilby                            | Ogilby           |
| Tunco Tailings            | c            | E. L. Riggs                      | Ogilby                            | Ogilby           |

|   |  |
|---|--|
| <i>Inyo County</i>  |  |
| American Eagle-----   | a  |
| Cardinal-----   | a  |
| Cleveland-----  | a  |
| Copper Queen-----   | a  |
| Silver Ball (Skidoo)-----   | a  |
| Stockwell-----  | a  |
| Ruth-----   | a  |
| <i>Kern County</i>  |  |
| Big Blue-----   | a  |
| Big Butte-----  | a  |
| Big Dike-----   | a  |
| Backboard-----  | a  |
| Cactus Queen-----   | a  |
| Elephant-Starlight and Lodesar-----   | a  |
| Golden Thread-----  | a  |
| Golden Queen-----   | a  |
| Keyes-----  | a  |
| King Solomon-----   | a  |
| Middle Butte-----   | a  |
| National-----   | a  |
| Operator-----   | a  |
| Standard-----   | a  |
| Sunshine-----   | a  |
| Tropicico-----  | a  |
| Yellow Aster-----   | a  |
| Yellow Dog-----   | a  |
| <i>Los Angeles County</i>   |  |
| Allison-----  | a  |
| Governor-----   | a  |
| Big Suzanna-----  | a  |
| <i>Marietta County</i>  |  |
| Bondurant-----  | a  |
| Champion-----   | a  |
| Diltz-----  | a  |
| Kumie & Ferris (Placer properties)-----   | h  |
| Miner's Hope-----   | a  |
| Mt. Gaines-----   | a  |
| Nutting Dredge-----   | h  |
| Original & Ferguson-----  | a  |
| Our Chance Mining Co.-----  | a  |
| Pine Tree, Josephine & French-----  | a  |
| Pyramid-----  | a  |
| <i>Inyokern</i>   |  |
| Bishop Creek-----   | a  |
| Bin D. Bishop-----  | a  |
| Big Pine-----   | a  |
| Trona-----  | a  |
| Lone Pine-----  | a  |
| Trona-----  | a  |
| <i>Kernville</i>  |  |
| 1231 Roosevelt Bldg., Los Angeles-----  | a  |
| Randsburg-----  | a  |
| Rosamond-----   | a  |
| Box 235, Mojave-----  | a  |
| Red Mountain-----   | a  |
| Mojave-----   | a  |
| Kernville-----  | a  |
| 183 N. Martel Ave., Los Angeles-----  | a  |
| Rosamond-----   | a  |
| Rosamond-----   | a  |
| Randsburg-----  | a  |
| Mojave-----   | a  |
| Randsburg-----  | a  |
| Rosamond-----   | a  |
| Randsburg-----  | a  |
| Mojave-----   | a  |
| <i>Kernville</i>  |  |
| 151 N. Florence St., Burbank-----   | a  |
| 725 S. Figueroa, Los Angeles-----   | a  |
| Fairmont-----   | a  |
| <i>Coulterville</i>   |  |
| Box 54, Coulterville-----   | a  |
| 1518 14th St., Sacramento-----  | a  |
| Box 96, Le Grand-----   | a  |
| Mariposa-----   | a  |
| Hornitos-----   | a  |
| Le Grand-----   | a  |
| Incline-----  | a  |
| Mariposa-----   | a  |
| Bear Valley-----  | a  |
| Hornitos-----   | a  |
| <i>Gold</i>   |  |
| a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline*dredge. | j. Copper-gold mine. k. Power shovel. l. Silver-gold mine. |

GOLD—Continued

*Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937*

| Mine                         | Type of mine | Operator                          | Address                                | Location of mine    |
|------------------------------|--------------|-----------------------------------|--|---------------------|
| <i>Merced County</i>         |              |                                   |  |                     |
| Merced                       | e            | Merced Dredging Co.               | Mills Tower, San Francisco             | Le Grange           |
| Merced Unit                  | e            | Yuba Consolidated Gold Fields     | 351 California St., San Francisco      | Snelling            |
| San Joaquin Dredge No. 1     | e            | San Joaquin Mining Co.            | 1805 Mills Tower, San Francisco        | Le Grange           |
| Snellings                    | e            | Snellings Gold Dredging Co.       | —                                      | Snelling            |
| <i>Mono County</i>           |              |                                   |  |                     |
| Chenung                      | a            | Conrad G. Monroe                  | Box 22, Bridgeport                     | Masonic             |
| Silverado & Kentuck          | 1            | Sierra Consolidated Mines, Inc.   | Wellington, Nev.                       | Sweetwater, Nev.    |
| Simpson                      | a            | Mutual Gold Corp.                 | Leevining                              | Leevining           |
| Standard                     | a            | Reseklip Mines Co.                | 206 Sansome St., San Francisco         | Bodie               |
| <i>Napa County</i>           |              |                                   |  |                     |
| Palisades                    | 1            | Coast Range Mining Co.            | Calistoga                              | Calistoga           |
| <i>Nevada County</i>         |              |                                   |  |                     |
| Atlas Gold Dredge            | e            | Atlas Gold Dredging Corp.         | 712 Edison Bldg., Los Angeles          | Grass Valley        |
| Bullion                      | a            | Grass Valley Bullion Mines        | 14 Wall St., Rm. 1507, New York, N. Y. | Grass Valley        |
| Empire Star Group            | a            | Empire Star Mines Co., Ltd.       | 745 Rowan Bldg., Los Angeles           | Grass Valley        |
| Golden Center                | a            | Cooley Butler                     | 310 Broad St., New York, N. Y.         | Grass Valley        |
| Hore                         | a            | Great Northern Gold Mines, Inc.   | Russ Bldg., San Francisco              | Nevada City         |
| Idaho Maryland and Brunswick | a            | Idaho Maryland Mines Corp         | Box 780, Nevada City                   | Grass Valley        |
| Lava Cap                     | a            | Lava Cap Gold Mining Corp         | Box 1106, Grass Valley                 | Nevada City         |
| Noramogqua                   | a            | Campbell Grass Valley Min. Co.    | Nevada City                            | Washington          |
| R. M. Bernard                | a            | R. M. Bernard                     | 922 Crocker Bldg., San Francisco       | Grass Valley        |
| Bradley Mining Co.           | a            | Bradley Mining Co.                | 1911 Mills Bldg., San Francisco        | North Columbia      |
| Spanish                      | —            | Spring Hill                       | —                                      | —                   |
| Spring Hill                  | a            | Spring Hill Gold Mines, Inc.      | —                                      | —                   |
| Trade                        | k            | Shovel Placer Co.                 | —                                      | —                   |
| <i>Placer County</i>         |              |                                   |  |                     |
| Alabama                      | a            | Alabama California Gold Mines Co. | Box 155, Auburn                        | Penryn              |
| Antelope Creek               | e            | Antelope Creek Dredging Co.       | 311 California St., San Francisco      | Loonies             |
| Auburn Chicago               | a            | Auburn Chicago Mining Co.         | Citizens Nat'l Bank Bldg., Los Angeles | Penryn              |
| Canyon (Rawnde)              | a            | Canyon Mines Corp.                | 144 Kearny St., San Francisco          | Baxter              |
| Davy Ravine                  | k            | Pantile Bros. & F. O. Bohnett     | Auburn                                 | Lincoln             |
| Edifice                      | a            | Anderson & Weber                  | —                                      | Penryn              |
| Fay Placer                   | h            | Fay Placer Mine                   | Box 274, Lincoln                       | Lincoln             |
| General Utility              | h            | General Utility Corp.             | Forum Bldg., Sacramento                | Roseville           |
| Gold Blossom                 | a            | A. L. Merritt                     | 200 Bush St., San Francisco            | Auburn              |
| Herman                       | —            | Lincoln Gold Dredging Co.         | Forest Hill                            | Forest Hill         |
| Lincoln                      | h            | —                                 | Box 334, Lincoln                       | Loonies and Lincoln |
| Lost Camp                    | g            | Lost Camp Mining Co.              | —                                      | Auburn              |
| Oakwood                      | h            | Oakwood Placer Mining Co.         | —                                      | Lincoln             |

|                              |   |                                |   |                   |
|------------------------------|---|--------------------------------|---|-------------------|
| Oro Bell                     | e | Oro Bell Dredging Co.          | Box 1051, Sacramento                        | Gold Run          |
| Recalp                       | h | Charles N. Chittenden          | 216 Pine St., San Francisco                 | Lincoln           |
| Ruben Johnson Ranch          | k | Jungens & Sparhawk             | Box 644, Lincoln                            | Lincoln           |
| Sera                         | f | E. B. Skiles                   | Roseville                                   | Roseville         |
| Theavenet Property           | k | W. Pitt Barnes                 | Auburn                                      | Auburn            |
| Turo                         | f | Gold Hill Dredging Co.         | Iowa Hill                                   | Iowa Hill         |
| Gold Hill                    | e |                                | 311 California St., San Francisco           | Loomis            |
| <i>Plumas County</i>         |   |                                |   |                   |
| Brilliant                    | a | General Mining Corp.           | Quincy                                      | Quincy            |
| Glacier                      | f | Wm. F. Booth & R. C. Foerster  | 57 Post St., San Francisco                  | Seneca            |
| Imperial                     | a | Gerald R. Simpson              | Quincy                                      | Quincy            |
| New York                     | a | Hammon Engineering Co.         | Balfour Bldg., San Francisco                | Greenville        |
| Virginia                     | a | Virginia Mining Corp.          | Virchila                                    | Virginia          |
| Walker                       | j | Walker Mining Co.              | 821 Kearns Bldg., Salt Lake City, Utah      | Walkermine        |
| <i>Riverside County</i>      |   |                                |   |                   |
| Golden Rod                   | a | O. K. Mining Co.               | 3325 E St., San Bernardino                  | Indio             |
| Gold Crown                   | a | Gold Crown Mining Co., Ltd.    | 730 Petroleum Securities Bldg., Los Angeles | Twenty-nine Palms |
| Smith                        | a | Cecil H. Smith                 | Mecca                                       | Mecca             |
| <i>Sacramento County</i>     |   |                                |   |                   |
| Biggs Ranch                  | e | Sacramento Gold Dredging Co.   | 351 California St., San Francisco           | Biggs Ranch       |
| Capital                      | e | Capital Dredging Co.           | 351 California St., San Francisco           | Folsom            |
| Cosumnes                     | e | Consumes Gold Dredging Co.     | 351 California St., San Francisco           | Stough House      |
| Gold Hill                    | e | Gold Hill Dredging Co.         | 311 California St., San Francisco           | Folsom            |
| Hoosier Gulch                | e | Hoosier Gulch Packers          | 815 17th St., Sacramento                    | Sacramento        |
| Marilyn                      | h | Marilyn Min. Co.               | Folsom                                      | Folsom            |
| Natomas                      | b | Natomas Co.                    | Box 1197, Sacramento                        | Natomas           |
| Scott Ranch                  | h | Lord & Bishop                  | Box 812, Sacramento                         | Sacramento        |
| <i>San Bernardino County</i> |   |                                |   |                   |
| Carlyle Group                | a | Carlyle Mining Co.             | 463 S. Clark Dr., Beverly Hills             | Twenty-nine Palms |
| Kelly                        | l | Frank W. Royer                 | 606 Hill St., Los Angeles                   | Red Mountain      |
| Mackson                      | a | Thomas M. Hall & Wm. Rosenberg | Ludlow                                      | Ludlow            |
| Santa Fe                     | l | F. H. Lamley                   | Red Mountain                                | Red Mountain      |
| <i>San Joaquin County</i>    |   |                                |   |                   |
| Wallace Dredge               | e | Wallace Dredging Co.           | 311 California St., San Francisco           | Camanche          |
| <i>Shasta County</i>         |   |                                |   |                   |
| A. C.                        | h | A. C. Mining Co.               | Redding                                     | Redding           |
| Backbone                     | a | Backbone Gold Mining Co.       | Kennett                                     | Kennett           |
| Carlson & Sandburg           | h | Carlson & Sandburg             | Redding                                     | Redding           |
| China Gulch                  | h | Roy S. Olson                   | Redding                                     | Redding           |
| Dry Creek                    | h | Midland Co., Inc.              | 733 Dwight Way, Berkeley                    | Cottonwood        |
| Gold Acres Estate            | h | Gold Acres Dredging Co.        | Cottonwood                                  | Cottonwood        |
| Iron Mountain                | a | The Mountain Copper Co., Ltd.  | 351 California St., San Francisco           | Matheson          |

a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-gold mine. k. Power shovel. l. Silver-gold mine.

## GOLD—Continued

Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937

| Mine                           | Type of mine | Operator                        | Address                                 | Location of mine |
|--------------------------------|--------------|---------------------------------|---|------------------|
| <i>Shasta County—Continued</i> |              |                                 |   |                  |
| Midland Dredge                 | h            | Midland Co., Inc.               | 733 Dwight Way, Berkeley                | Cottonwood       |
| Pioneer                        | h            | Golden State Dredging Co.       | Redding                                 | Redding          |
| Plummer                        | h            | Pioneer Dredging Co.            | Box 700, Redding                        | Cottonwood       |
| Roaring River                  | h            | El Oro Dredging Co.             | Cottonwood                              | Cottonwood       |
| Walker                         | e            | Roaring River Gold Dredging Co. | 351 California St., San Francisco       | Redding          |
| Yankee Jack                    | a            | Star Gulch Mining Co.           | Box 740, Redding                        | Redding          |
| Haleyton                       | a            | J. L. Hill                      | Redding                                 | French Gulch     |
| Taylor Dredge                  | k            | J. H. Scott Co.                 | Merchants Exchange Bldg., San Francisco | Igo              |
| <i>Sierra County</i>           |              |                                 |   |                  |
| Bigelow                        | a            | S. H. Gillespie                 | Sierra City                             | Sierra City      |
| Depot Hill & Indian Hill       | g            | F. J. Joubert                   | Campionville                            | Campionville     |
| Kenton                         | a            | Gamble & Wilson                 | Alleghany                               | Alleghany        |
| Oxford                         | a            | Oxford Consolidated Mines Co.   | 314 17th St., Oakland                   | Downieville      |
| Oriental                       | a            | R. P. Hawkins                   | Alleghany                               | Alleghany        |
| Piumbago                       | a            | Socorro Mines, Inc.             | Forest                                  | Alleghany        |
| Ruby                           | a            | C. L. Best                      | 800 Davis St., San Leandro              | Pike             |
| Sierra Alaska                  | a            | Sierra Alaska Mining Co.        | Pike                                    | Alleghany        |
| Sixteen to One                 | a            | Original 16 to 1 Mines, Inc.    | 1611 Russ Bldg., San Francisco          |                  |
| Bonanza                        | a            | R. C. Kramer                    | Forks of Salmon                         |                  |
| Cal Oro                        | e            | Cal Oro Dredging Co.            | Yreka                                   |                  |
| Gold Ball                      | a            | Gold Ball Mining Co.            | Sawyers Bar                             |                  |
| Grand National                 | a            | Grand National Mining Co.       | Callahan                                |                  |
| Ita May, Klamath Mountain      | a            |                                 |   |                  |
| Laurel                         | a            | Noreal Mining Co.               | 6427 E. Marginal Way, Seattle, Wash.    |                  |
| King Solomon                   | a            | King Solomon Mines Co.          | Monte Vista, Colorado                   |                  |
| McConnell Bar                  | a            | W. D. Boulter                   | Yreka                                   |                  |
| Siskiyou Units                 | k            | Yuba Consolidated Gold Fields   | Callahan                                |                  |
| Yreka Dredge                   | e            | Yreka Gold Dredging Co.         | Yreka                                   |                  |
| <i>Stanislaus County</i>       |              |                                 |   |                  |
| La Grange                      | e            | La Grange Dredging Co.          | Mills Bldg., San Francisco              | La Grange        |
| <i>Trinity County</i>          |              |                                 |   |                  |
| Arbuckle & Lorenz Ranch        | h            | Oro Trinity Dredging Co.        | Box 212, Oroville                       | Weaverville      |
| Brown Bear                     | a            | Brown Bear Mines Corp.          | Lewiston                                | Lewiston         |
| Enterprise                     | a            | Chiksan Oil Co.                 | 401 Chapman Bldg., Fullerton            | Helena           |
| Indian Creek                   | h            | Carlson & Sandburg              | Redding                                 | Redding          |
| Junction City                  | e            | Junction City Mining Co.        | 685 6th St., San Francisco              | Junction City    |

|  |                                   |   |
|--|-----------------------------------|---|
| Lewiston Dredge-----                       | e                                 | Lewiston                                  |
| Phillips-----                              | g                                 | Redding                                   |
| Red Hill-----                              | g                                 | Northern California Mines Co.             |
| Trinity-----                               | e                                 | Trinity Dredging Co., Mary E. Smith, Mgr. |
| Weaver Dredge-----                         | h                                 | Weaver Dredging Co.                       |
| Williams & Crawford Ranch-----             | h                                 | Hayfork Gold Dredging Co.                 |
| <i>Tuolumne County</i>                     |                                   |   |
| Columbus-----                              | a                                 | Columbus Gold Mining Co.                  |
| Confidence-----                            | a                                 | Confidence Gold Mining Co.                |
| Logic-Shawmut-----                         | a                                 | Miller & Clemson                          |
| Enterprise-----                            | a                                 | Philip L. Small                           |
| Exin-Go-Bragh-----                         | a                                 | California Standard Gold Mines Corp.      |
| Experiment-----                            | a                                 | Shoestring Mining Co.                     |
| Hard Gravel-----                           | k                                 | Premier Mining Co.                        |
| Healep Hill-----                           | a                                 | Gold Diggers Syndicate                    |
| Jackass Hill-----                          | d                                 | Charles Gillis                            |
| Jack Dredge-----                           | h                                 | E. A. Kent                                |
| Menke-Hess-----                            | k                                 | Menke-Hess Gravels, Inc.                  |
| Mohrman-----                               | a                                 | Chas. & Elwin Harper                      |
| Moecasin-----                              | h                                 | Moecasin Mine                             |
| <i>Yuba County</i>                         |                                   |   |
| Blue Point-----                            | f                                 | Gold Exploration Mining Co.               |
| Garden Valley-----                         | k                                 | F. O. B. Bennett                          |
| Mt. De Oro-----                            | a                                 | Mt. De Oro Mines Co.                      |
| Merilyn-----                               | h                                 | Marilyn Mining Co.                        |
| Williams Bar-----                          | e                                 | Williams Bar Gold Dredging Co.            |
| Yuba-----                                  | a                                 | Yuba Consolidated Gold Fields             |
| Redding-----                               |                                   |   |
| First Nat'l Bank Bldg., San Francisco----- | 1225 Crocker                      | Redding                                   |
| Lewiston-----                              |                                   |   |
| Redding-----                               | 1225 Crocker                      | Lewiston                                  |
| Weaverville-----                           |                                   |   |
| Redding-----                               | 1225 Crocker                      | Weaverville                               |
| Hayfork-----                               |                                   |   |
| Redding-----                               | 1225 Crocker                      | Hayfork                                   |
| Tuolumne-----                              |                                   |   |
| Montgomery St., San Francisco-----         | 1                                 | Tuolumne                                  |
| Montgomery St., San Francisco-----         | 405                               | Montgomery St., San Francisco             |
| Santa Fe Ave., Los Angeles-----            | 4800                              | Santa Fe Ave., Los Angeles                |
| Sonora-----                                |                                   |   |
| Chinese Camp-----                          | Sonora                            | Sonora                                    |
| Jamesstown-----                            |                                   |   |
| Standard Gold Mines Corp.-----             | Box 176                           | Jamestown                                 |
| Box 176, Columbia-----                     | 111 Sutter St.                    | Columbia                                  |
| Columbia-----                              |                                   |   |
| Sutter St., San Francisco-----             | Jamestown                         | Columbia                                  |
| Jamestown-----                             |                                   |   |
| Sutter St., San Francisco-----             | Sonor                             | Jamestown                                 |
| Sonora-----                                |                                   |   |
| California St., San Francisco-----         | 149                               | Sonora                                    |
| Chinese Camp-----                          |                                   |   |
| Oakdale-----                               | Oakdale                           | Chinese Camp                              |
| Big Oak Flat-----                          | Big Oak Flat                      | Groveland                                 |
| 5220 21st Ave., Sacramento-----            | 5220 21st Ave.                    | Columbia                                  |
| Smartville-----                            |                                   |   |
| San Jose-----                              | Smartville                        | Smartville                                |
| Woodleaf-----                              | San Jose                          | Woodleaf                                  |
| Wheatland-----                             | Woodleaf                          | Wheatland                                 |
| Mills Bldg., San Francisco-----            | Box 195                           | Mills Bldg.                               |
| 351 California St., San Francisco-----     | Wheatland                         | Marysville                                |
| Challenge-----                             | Mills Bldg.                       | Hampton                                   |
| Horsehoe Gold Mining Co.-----              | 351 California St., San Francisco | Challenge                                 |

a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-gold mine. k. Power shovel. l. Silver-gold mine.

## GRANITE

| Operator  | Product   | Address                            | Location of quarry     |
|---|-----------|------------------------------------|------------------------|
| GRANITE   |           |                                    |                        |
| <i>Fresno County</i><br>Academy Granite<br>Superior Granite Co., Inc.   | a<br>a    | Clovis<br>Clovis                   | Clovis<br>Academy      |
| <i>Lassen County</i><br>A. D. Greig, Greig Quarry                       | a         | Susanville                         | Susanville             |
| <i>Los Angeles County</i><br>Binder Bros., W. H. Binder                 | d         | 285 N. Lake Ave., Pasadena         | Boquet Canyon          |
| <i>Madera County</i><br>McGivray Raymond Corp.                          | a         | 3 Potrero Ave., San Francisco      | Raymond                |
| <i>Mariiposa County</i><br>Yosemite National Park                       | a         | Yosemite                           | Yosemite Park          |
| <i>Nevada County</i><br>Netz Granite Quarry, Ludwig Netz                | a         | Nevada City                        | Nevada City            |
| <i>Placer County</i><br>Victor Wickman                                  | a         | Rocklin                            | Rocklin                |
| <i>Plumas County</i><br>Paul Sonognini                                  | a         | Chilcoot                           | Chilcoot               |
| <i>Riverside County</i><br>Emil Johnson                                 | a         | Perris                             | Perris                 |
| <i>Son Bernardino County</i><br>Texas Quarries, Inc., R. M. Richter     | a         | Rives-Strong Bldg., Los Angeles    | Victorville            |
| <i>San Diego County</i><br>American Marble & Granite Works              | a         | 1212 E. Olympic Blvd., Los Angeles | Santee                 |
| Crystal Black Quarry, John Stridsburg                                   | a         | Escondido                          | Spock's Canyon         |
| Matson & Deering, Meyers Quarry   | a         | Lakeside                           | Lakeside               |
| Pacific Cut Stone & Granite Co.   | a         | 414 S. Marengo Ave., Alhambra      | Escondido              |
| <i>Sonoma County</i><br>S. Cabrol                                       | b, c<br>a | Glen Ellen<br>Fillmore             | Glen Ellen<br>Fillmore |
| <i>Ventura County</i><br>Ritchie Bros., R. A. Ritchie and J. A. Ritchie | a         | Grimes Canyon                      | Grimes Canyon          |

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone. d. Mica schist used as building stone.

## GYPSUM

| GYPSUM  |  | Address   | Location of quarry                      |
|---|--|---|---|
| Operator  |  |   |   |
| <i>Fresno County</i><br>Dos Palos Gypsum Co., O. L. Divens and A. A. Conrowe<br>Green & Collins<br>Paoli Gypsum Mine, A. P. Shepard, Mgr. |  | Dos Palos<br>Ceres<br>3101 Mariposa St., Fresno | Dos Palos<br>South Dos Palos<br>Mendota |
| <i>Imperial County</i><br>Imperial Gypsum Quarry, Pacific Portland Cement   |  | 111 Sutter St., San Francisco                   | Plaster City                            |
| <i>Riverside County</i><br>U. S. Gypsum Co.   |  | 507 Architects Bldg., Los Angeles               | Midland                                 |

## IODINE

| IODINE  |  | Address   | Mine                  |
|---|--|---|-----------------------|
| Operator  |  |   |                       |
| <i>Los Angeles County</i><br>Deepwater Chemical Co., Ltd.<br>L. O. Dow Chemical Co. |  | Box 588, Compton<br>310 Santiago Ave., Long Beach | Compton<br>Long Beach |
|   |  |   |                       |

## IRON

| IRON   |  | Address                                | Location of mine     |
|--|--|--|----------------------|
| Operator   |  |  |                      |
| <i>Inyo County</i><br>Hoot Owl Iron Deposit, Lloyd Helm<br>L. S. McGirk                                  |  |  | Inyokern<br>Shoshone |
| <i>San Bernardino County</i><br>Cave Canyon Iron Mine, A. S. Vinnell Co.<br>Iron Hat Group, Tom Scofield |  | 11 Westminster Ave., Alhambra<br>Amboy | Baxter<br>Cadiz      |

**LEAD**  
*Principal Lead Producers in California during 1937*

| Mine                         | Operator                                      | Address                                | Location of mine  |
|------------------------------|---|--|-------------------|
| <i>Inyo County</i>           |   |  |                   |
| Bunker Hill                  | Bunker Hill Mining Co.                        | Big Pine                               | Big Pine          |
| Copper Queen                 | Gold Bottom Mines, Inc.                       | Box 1556, Bakersfield                  | Trona             |
| Darwin Lead                  | Darwin Lead Co.                               | Darwin                                 | Darwin            |
| Golden Treasure              | J. P. Madison & Ashford Bros.                 | Shoshone                               | Shoshone          |
| Keystone                     | Darwin Keystone, Ltd.                         | Piru                                   | Darwin            |
| Opahr                        | C. O. Mittendorf                              | Randsburg                              | Trona             |
| Royal Group                  | Cerro Gordo Ext. Mining Co.                   | Keeler                                 | Keeler            |
| Santa Rosa                   | Santa Rosa Mines Dev. Co., G. W. Dow, Trustee | Keeler                                 | Keeler            |
| Sure Contest                 | H. L. Eckhoff                                 | Keeler                                 | Keeler            |
| Ventura                      | Charles Bangoe                                | Box 156, Keeler                        | Laws              |
| Westgard                     | Mark Bradshaw                                 | Laws                                   | Darwin            |
|                              | L. D. Foreman & Co.                           | Darwin                                 | Death Valley      |
|                              | Grant Snyder                                  | Death Valley                           |                   |
| <i>Mono County</i>           |   |  |                   |
| Anthony                      | Earl Oxborrow                                 | Topaz                                  | Topaz             |
| <i>Nevada County</i>         |   |  |                   |
| Empire Star Group            | Empire Star Mines Co., Ltd.                   | 14 Wall St., Rm. 1507, New York, N. Y. | Grass Valley      |
| Lava Cap                     | Lava Cap Gold Mining Corp.                    | Box 780, Nevada City                   | Nevada City       |
| Spanish                      | Bradley Mining Co.                            | Crocker Bldg., San Francisco           | Washington        |
| <i>San Bernardino County</i> |   |  |                   |
| Carbonate                    | P. F. Hillwig                                 | Oro Grande                             | Oro Grande        |
| Carlyle Group                | Carlyle Mining Co.                            | 463 S. Clark Dr., Beverly Hills        | Twenty-nine Palms |
| Iron Horse                   | Tony Martilletti                              | Cima                                   | Cima              |

| Operator   | Product | Address  | Location of quarry |
|--|---------|--|--------------------|
| <i>Alameda County</i><br>Westvaco Chlorine Prod. Corp.       | a, d    | Newark   | Newark             |
| <i>El Dorado County</i><br>Auburn Chemical Lime Co., Ltd.    | a, b    | Auburn   | Newcastle          |
| Diamond Springs Lime Co.                                     | a, b    | Diamond Springs                                  | Diamond Springs    |
| El Dorado Limestone Co., J. H. Bell, Pres.                   | b, c    | Shingle Springs                                  | Shingle Springs    |
| Pac. Portland Cement Co., Cons.                              | b       | 111 Sutter St., San Francisco                    | Auburn             |
| <i>Palo Alto</i><br>Mt. Campbell Lime Co., R. C. Finek, Mgr. | c, e    | Dinuba   | Redley             |
| <i>Los Angeles County</i><br>W. F. Glasser, Inc.             | b       | 713 N. Sepulveda, Brentwood Heights, Los Angeles |                    |
| <i>San Bernardino County</i><br>Cal. Portland Cement Co.     | a, b, c | 601 W. 5th St., Los Angeles                      | Colton             |
| Chubbuck Lime Co., Chas. T. Chubbuck                         | b       | 500 Worth St., Los Angeles                       | Chubbuck           |
| Pacific Coast Talc Co.                                       | b       | 2149 Bay St., Los Angeles                        | Silver Lake        |
| Victorville Lime Rock Co.                                    | b       | 2424 Enterprise St., Los Angeles                 | Victorville        |
| <i>San Luis Obispo County</i><br>Charles Taylor              | b       | Salinas  | Cambria            |
| <i>San Mateo County</i><br>Pacific Portland Cement Co.       | c, d    | 111 Sutter St., San Francisco                    | San Mateo          |
| <i>Santa Clara County</i><br>Bay Shell Co.                   | c, d    | 503 Market St., San Francisco                    | Alviso             |
| L. H. Beck   | c, d    | Box 113, Colma                                   | Alviso             |
| California Lime Marl Fertilizer Co.                          | c, e    | R.F.D. 1, Box 684, San Jose                      | Edenvale           |
| W. B. Orley Shell Co.  | d       | Alviso   | Alviso             |
| <i>Santa Cruz County</i><br>Basic Limestone Products Co.     | a, b    | 625 Market St., San Francisco                    | Santa Cruz         |
| Henry Cowell Lime and Cement Co., W. H. George, Mgr.         | a, b    | 2 Market St., San Francisco                      | Santa Cruz         |
| Pacific Limestone Prod. Co.                                  | b       | Spring St., Santa Cruz                           | Santa Cruz         |
| <i>Sonoma County</i><br>J. F. Bishop                         | a       | Box 501, Santa Rosa                              | Geyerville         |
| <i>Yolo County</i><br>McLean Quarry, W. S. McLean            | a       | 419 Bayshore Blvd., San Francisco                |                    |
| U. S. Lime Products Corp.                                    | a, b    | 58 Sutter St., San Francisco                     | Columbia           |
|  |         |  | Sonora             |

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

| MAGNESITE  |         |                  |
|--|---------|------------------|
| Operator   | Address | Location of mine |
| <i>Santa Clara County</i><br>Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine | Newark  | Red Mountain     |
| <i>Stanislaus County</i><br>Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine         | Newark  | Gustine          |

| MAGNESIUM SALTS  |                                |                                |                     |
|--|--------------------------------|--------------------------------|---------------------|
| Operator   | Product                        | Address                        | Location of plant   |
| <i>San Diego County</i><br>Westvaco Chlorine Prod. Corp.     | Chloride                       | Newark                         | San Diego           |
| <i>San Mateo County</i><br>Marine Chemical Co., R. E. Clarke | Carbonate, hydroxide and oxide | South San Francisco            | South San Francisco |
| Plant Rubber & Asbestos Works                                | Carbonate                      | 537 Brannan St., San Francisco | Redwood City        |

## MARBLE (Including Onyx and Travertine)

| Operator   | Product | Address                              | Location of quarry |
|--|---------|--------------------------------------|--------------------|
| <i>Los Angeles County</i><br>W. F. Glasser, Inc.                                   | b       | 713 N. Sepulveda, Los Angeles        | Brentwood Heights  |
| <i>San Bernardino County</i><br>Onyx Mine, John Olsen & Pete Logan<br>Howard Small | c<br>c  | Whitewater<br>311 Main St. Riverside |                    |
| <i>San Luis Obispo County</i><br>Reynolds Quarry, Thomas C. Reynolds               | b       | Box 53, Paso Robles                  | Paso Robles        |
| <i>Santa Barbara County</i><br>G. Antolini   | b       | 111 E. Gutierrez St., Santa Barbara  | Tijucas            |
| <i>Tuolumne County</i><br>Columbia Marble Co.                                      | a       | Columbia, Tuolumne County            | Columbia           |

a. Marble. b. Limestone, building and flagstone. c. Onyx and travertine.

## MICA

| Operator                                      | Variety     | Address                          | Location of property |
|---|-------------|----------------------------------|----------------------|
| <i>Imperial County</i><br>Mica Tale Co., Inc. | Mica schist | 2808 S. Pacific Blvd., San Pedro | Ogilby               |
| <i>Mariposa County</i><br>Sierra Minerals Co. | Sericite    | Le Grand                         | Le Grand             |

## MINERAL PAINT

| Operator   | Address                              | Location of property |
|--|--------------------------------------|----------------------|
| <i>Nevada County</i><br>Dempsey Ranch Deposit, N. L. Wimmer & Peterson | 74 New Montgomery St., San Francisco | Waddles              |
| <i>Placer County</i><br>Synthetic Iron Color Co.                       | Richmond                             | Forest Hill          |
| <i>Yuba County</i><br>Dempsey Ranch Deposit, N. L. Wimmer & Peterson   | 74 New Montgomery St., San Francisco | Strawberry Valley    |

## MINERAL WATER

| Operator   | Address   | Location of spring  |
|--|---|---|
| <i>Butte County</i><br>Feather River Canyon Spring Water Co., R. E. Chappell<br>Richardson Springs, Lee Richardson, Mgr.-----  | 2215 L St., Sacramento<br>Chico-----  | Pulga<br>Chico-----   |
| <i>Calaveras County</i><br>Mok-Hill Mineral Springs, L. Walkmeister-----   | Sutter Creek-----   | Sutter Creek  |
| <i>Colusa County</i><br>Cooks Springs, D. D. Martham-----  | Lodoga-----   | Cooks Springs   |
| <i>Contra Costa County</i><br>Alhambra Water Co.-----  | Martinez-----   | Martinez  |
| <i>El Dorado County</i><br>Digger Indian Natural Medicine Water Co.-----   | Randall P.O.-----   | Randall   |
| <i>Lake County</i><br>Adams Mineral Springs, Clarence Prather-----<br>The Majestic Bottling Co.-----<br>Norman Mineral Sprines, H. C. Norman, Mgr.<br>Witter Medical Springs, W. E. Whittaker-----   | Adams, via Middletown-----<br>20 Beideman St., San Francisco-----<br>Middletown-----<br>995 Market St., San Francisco-----  | Adams<br>Bartlett Springs<br>Middletown<br>Witter Springs   |
| <i>Los Angeles County</i><br>Cascade Water Co.-----<br>Deep Rock Artesian Water-----<br>Elysian Spring Water Co.-----<br>Espriego Artesian Water-----<br>Holy Spring Water-----<br>Magnetic Spring Water Co.-----<br>Mission Spring Water Co.-----<br>Mountain Spring Water Co.-----<br>Pure-Fax Mineral Water Co.-----<br>Sparklet Bottled Water Co.----- | 4556 York Blvd., Los Angeles-----<br>4416 York Blvd., Los Angeles-----<br>1536 Baxter, Los Angeles-----<br>4430 York Blvd., Los Angeles-----<br>9398 Holly Dr., Los Angeles-----<br>9336 Palm Ave., Sherman-----<br>8938 Keirth, Hollywood-----<br>2226 S. Avenue 54, Los Angeles-----<br>3640 Griffin, Los Angeles-----<br>4500 York Blvd., Los Angeles----- | Los Angeles<br>Los Angeles |
| <i>Marin County</i><br>Purity Spring Water Co.-----  | 2032 Kearny St., San Francisco-----   | Calistoga-----  |
| <i>Napa County</i><br>Calistoga Bottling Works, E. E. Hardies-----<br>Napa Soda Springs Co., G. H. T. Jackson-----<br>Napa, Vichy Springs, V. Frugoli-----<br>Samuels Soda Springs, Mrs. Robert J. Little-----   | 313 Montgomery St., San Francisco-----<br>225 Bay St., San Francisco-----<br>Monticello-----  | Calistoga-----<br>Napa<br>Napa<br>Monticello-----   |

|                              |  |  |
|------------------------------|--|--|
| <i>Riverside County</i>      | Bauilah Springs, Oscar C. McNicholl.....                     | Arlington.....                             |
| <i>San Bernardino County</i> | Arrowhead Hot Springs, Calf. Cons. Water Co.....             | 1566 E. Washington Blvd., Los Angeles..... |
| <i>San Diego County</i>      | Cuyamaca Mineral Water, San Diego Ice & Cold Storage Co..... | 67 8th St., San Diego.....                 |
|                              | Rock Springs Co., E. S. Walk.....                            | R.F.D. 2, Box 442, Escondido.....          |
| <i>San Francisco County</i>  | Blue Crest Beverage Co., Morris & Paul Greenberg.....        | 265 Naples St., San Francisco.....         |
|                              | Diamond Rock Spring Water Co., L. Pahlmelli.....             | 247 Naples St., San Francisco.....         |
| <i>San Luis Obispo</i>       | Crystal Spring Water Co., W. R. Hudson.....                  | R.F.D. 2, Box 11, San Luis Obispo.....     |
| <i>Santa Barbara County</i>  | Veronica Mineral Springs Co.....                             | 699 Brannan St., San Francisco.....        |
| <i>Siskiyou County</i>       | The Shasta Water Co.....                                     | 6th and Brannan Sts., San Francisco.....   |
|                              | Yreka Coco Cola Bottling Works, Fred J. Meamber, Prop.....   | Yreka.....                                 |
| <i>Sonoma County</i>         | Agua Caliente Springs Co., T. H. Corcoran, Prop.....         | Agua Caliente.....                         |
|                              | Bareal Springs, John Kolling.....                            | Preston.....                               |
|                              | Boyes Springs Mineral Water Co.....                          | Boyes Springs.....                         |
|                              | Fetters Mineral Springs, George Fetters.....                 | Fetters Springs.....                       |

**PLATINUM**  
*Principal Platinum Producers in California in 1937*

| Operator  | Address  | Location of mine   |
|---|--|--|
| <i>Amador County</i><br>Comanche Gold Dredging Co.  | 311 California St., San Francisco  | Comanche   |
| <i>Butte County</i><br>Yuba Cons. Goldfields Co.*   | 351 California St., San Francisco  | Rio Bonito   |
| <i>Merced County</i><br>Merced Dredging Co.<br>San Joaquin Mining Co.<br>Yuba Consolidated Gold Fields*   | Mills Bldg., San Francisco<br>1805 Mills Tower, San Francisco<br>351 California St., San Francisco                         | Snelling<br>Snelling<br>Snelling   |
| <i>Placer County</i><br>Gold Hill Dredging Co.  | 311 California St., San Francisco  | Loomis   |
| <i>Sacramento County</i><br>Capital Dredging Co.*<br>Natomas Co.*   | Balfour Bldg., San Francisco<br>Forum Bldg., Sacramento  | Folsom<br>Natomas  |
| <i>Shasta County</i><br>Cascade Dredging Co., B. M. Stites<br>El Oro Dredging Co., Vernon H. Carter<br>Gold Acres Dredging Co., P. G. Flumerfelt<br>The Midland Co.*<br>Roaring River Gold Dredging Co. | Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood | Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood<br>Cottonwood |
| <i>Trinity County</i><br>Hayfork Dredging Co.<br>Junction City Mining Co.   | Hayfork<br>Junction City   | Hayfork<br>Junction City   |
| <i>Yuba County</i><br>Yuba Consolidated Gold Fields*  | 351 California St., San Francisco  | Hammonton  |
| POTASH  |  |  |
| Operator  | Address  | Location of plant  |
| <i>San Bernardino County</i><br>American Potash and Chemical Co.  | Trona  | Trona  |

\*Platinum metals not sold in 1937.

## PUMICE OR VOLCANIC ASH

| Operator   | Product          | Address  | Location of quarry                                   |
|--|------------------|--|--|
| <i>Imperial County</i><br>Chamberlain Co., Inc.  | a                | 2550 E. 9th St., Los Angeles.  | Calipatria   |
| <i>Inyo County</i><br>Chas. Brown<br>Little Lake Pumice Co.<br>Red Mountain Cinder Quarry, H. P. Theban<br>Tonopah & Tidewater Ry. | a<br>a<br>b<br>b | Shoshone<br>1204 S. Monterey St., Alhambra<br>Little Lake<br>510 W. 6th St., Los Angeles.                | Shoshone<br>Coso Junction<br>Little Lake<br>Shoshone |
| <i>Kern County</i><br>Cudahy Packing Co.   | b                | 803 Macy St., Los Angeles.   | Ceneda   |
| <i>Madera County</i><br>Elmer Erickson<br>Friant Pumice Co., Earl R. Carper  | a, b             | Friant<br>818 Pacific Southwest Bldg., Fresno  | Friant<br>Friant                                     |
| <i>Marietta County</i><br>Sierra Minerals Co.  | a                | Le Grande  | Le Grande  |
| <i>Napa County</i><br>C. Cicero  | a                | 4261 23d St., San Francisco  | Monticello   |
| <i>San Luis Obispo County</i><br>Red Eagle Mine, M. L. Francis   | b                | Creston  | Creston  |
| <i>Siskiyou County</i><br>Aristone Corp. or E. Bear  | a                | 2800 Board of Trade Bldg., Chicago, Ill., 1600 Golden Gate Ave., San Francisco                           | Pumice Mt.<br>Pumice Mt.<br>Glass Mt.                |
| G. Z. Johnson<br>Volcanic Products Co., Ray N. Fouch<br>Dan A. Williams  | a<br>a<br>a      | 255 California St., San Francisco<br>1111 Alameda Ave., Klamath Falls, Ore.<br>217 Monterey St., Salinas | Mt. Hoffman  |

a. Pumice. b. Volcanic ash.

| Operator   | Address                           | Location of mine |
|--|-----------------------------------|------------------|
| <i>Shasta County</i><br>Mountain Copper Co., Wm. F. Kett, Mgr. | 351 California St., San Francisco | Matheson         |

**QUICKSILVER**  
*Principal Quicksilver Producers in California for 1937, out of a Total of 65 Operating Properties*

| Mine  | Operator  | Address                             | Location of mine |
|---|---|-------------------------------------|------------------|
| <i>Coloisa County</i><br>Wide Awake Mine----- | A. A. Gibson-----                                   | Wilbur Springs-----                 | Wilbur Springs   |
| <i>Contra Costa County</i><br>Mt. Diablo----- | Bradley Mining Co.-----                             | Crooker Bldg., San Francisco-----   | Clayton          |
| <i>Fresno County</i><br>Archer-----           | Joseph Byles & Sons-----                            | Coalinga-----                       | Coalinga         |
| <i>Inyo County</i><br>Coso Hot Springs-----   | J. F. Sanders-----                                  | Little Lake-----                    | Little Lake      |
| <i>Kern County</i><br>Cuddeback -----         | Walabu Mining Co.-----                              | Box 1168, Bakersfield-----          | Keene            |
| <i>Lake County</i><br>Anderson Mine-----      | Albert Baker & D. Strickler-----                    | Middletown-----                     | Anderson Springs |
| Great Western-----                            | Bradley Mining Co.-----                             | Crooker Bldg., San Francisco-----   | Middleton        |
| Helen Mine-----                               | L. S. Peterson (Lessee)-----                        | Middleton-----                      | Middleton        |
| Mirabel-----                                  | Mirabel Quicksilver Co.-----                        | Middleton-----                      | Middleton        |
| Sulphur Bank-----                             | Bradley Mining Co.-----                             | Crooker Bldg., San Francisco-----   | Lower Lake       |
| <i>Monterey County</i><br>G. W. D. Mine-----  | T. E. Washburn-----                                 | Box 785, Coalinga-----              | Parkfield        |
| Patriquin Mine-----                           | W. M. Gooschalk (Owner)-----                        | 609 Mills Bldg., San Francisco----- | Parkfield        |
| <i>Napa County</i><br>La Joya-----            | La Joya Quicksilver Mine, Morgan North, Mer.-----   | Oakville-----                       | Oakville         |
| Manhattan Mine-----                           | Chas. Wilson & W. M. Hietox.-----                   | Monticello-----                     | Monticello       |
| Oat Hill-----                                 | Oat Hill Mine, Inc., R. A. Hanan, Secy.-Treas.----- | 369 Pine St., San Francisco-----    | Oat Hill         |
| Oat Hill Extension-----                       | Zack Anderson-----                                  | Middleton-----                      | Oat Hill         |
| <i>San Benito County</i><br>Aurora-----       | San Benito Mining Co., Ltd.-----                    | Box 38, Le Grand-----               | Idria            |
| Florence Mac Mine-----                        | R. Orozco et al., Rex Smith, Mgr.-----              | San Benito-----                     | Hernandez        |
| New Idria-----                                | New Idria Quicksilver Mining Co.-----               | Mills Bldg., San Francisco-----     | Idria            |
| Stayton Quicksilver Mine-----                 | R. B. Knox-----                                     | Hollister-----                      | Hollister        |

|                             |  |
|-----------------------------|--|
| <i>San Luis Obispo</i>      |  |
| Josephine Mine              | C. C. Thompson                                       |
| Klau                        | Klau Mine, Inc.                                      |
| Oceanic                     | Anglo American Mining Corp.                          |
| Rinconada                   | Theresa L. Bell, Owner                               |
| <i>Santa Barbara County</i> |  |
| Lion Den                    | Cal Mer Co., c/o P. B. De Mandel                     |
| Los Prientos                | T. H. Canfield                                       |
| Red Rock                    | Santa Ynez Mercury Co., Hans Peters, Pres.           |
| <i>Santa Clara County</i>   |  |
| Guadalupe Mine              | Laco Mining Co., H. N. Mason                         |
| Little Almaden              | Quicksilver Mining Co., F. R. Schneider              |
| New Almaden Dump            | Ben Black, Owner                                     |
| <i>Sonoma County</i>        |  |
| Cloverdale                  | Cloverdale Quicksilver Mine, Att. Mr. George H. Burr |
| Culver Bear                 | C. A. Baumester                                      |
| <i>Trinity County</i>       |  |
| Altoona                     | Altoona Q. Mining Co., J. Frowenfeld, Pres.          |
| <i>Yolo County</i>          |  |
| Harrison Mine               | J. W. Abercrombie, et al.                            |
|                             | Paso Robles Mills Bldg., San Francisco               |
|                             | Mills Bldg., San Francisco                           |
|                             | Santa Margarita                                      |
|                             | Adelaide   |
|                             | Adelaide   |
|                             | Cambria  |
|                             | Santa Margarita                                      |
|                             | Los Olivos   |
|                             | Santa Barbara  |
|                             | Solvang  |
|                             | Box 634, Santa Barbara                               |
|                             | Box 277, Santa Barbara                               |
|                             | Solvang  |
|                             | R.F.D. 3, Box 412, Los Gatos                         |
|                             | Los Gatos  |
|                             | Almaden  |
|                             | Almaden  |
|                             | Cloverdale   |
|                             | Cloverdale   |
|                             | Castella   |
|                             | Middletown   |
|                             | Rumsey   |

| SALT   |                                       |                   |                     |
|--|---------------------------------------|-------------------|---------------------|
| Operator   | Address                               | Location of plant |                     |
| <i>Alameda County</i><br>Leslie Salt Co.                                 | 310 Sansome St., San Francisco        | -----             | Newark and Mt. Eden |
| <i>Imperial County</i><br>Imperial Salt Co.                              | 4000 E. Washington Blvd., Los Angeles | -----             | Calipatria          |
| <i>Kern County</i><br>Long Beach Salt Co.                                | P.O. Box 28, Long Beach               | -----             | Saltdale            |
| <i>Los Angeles County</i><br>Long Beach Salt Co.                         | P.O. Box 28, Long Beach               | -----             | Long Beach          |
| <i>Madera County</i><br>Surprise Valley Salt Works, Joshua H. Hutchinson | Box 26, Cedarville                    | -----             | Lake City           |
| <i>Monterey County</i><br>Monterey Bay Salt Co., E. C. Vierra, Mgr.      | Moss Landing                          | -----             | Moss Landing        |
| <i>Orange County</i><br>Irvine Salt Co.                                  | Irvine                                | -----             | Tustin              |
| <i>San Bernardino County</i><br>California Rock-Salt Co.                 | 2465 Hunter St., Los Angeles          | -----             | Amboy               |
| Rock Salt Products Co.   | 845 El Centro St., South Pasadena     | -----             | Salt Marsh          |
| <i>San Diego County</i><br>Western Salt Co.                              | 1245 National Ave., San Diego         | -----             | San Diego           |
| <i>San Mateo County</i><br>Stauffer Chemical Co.                         | 636 California St., San Francisco     | -----             | Redwood City        |

## SANDSTONE—SILICA—CYANITE GROUP

161

## SANDSTONE

| SANDSTONE   |                                  |
|---|----------------------------------|
| Operator  | Address                          |
| <i>Los Angeles County</i><br>R. L. Glover   | 917 W. 6th St., Los Angeles      |
| <i>Monterey County</i><br>Carmel Stone Quarry, A. L. Possidori<br>Sierra Quarry, H. E. Rogers<br>Andrew Stewart | Box 136, Carmel<br>Carmel Valley |
| <i>Sonoma County</i><br>S. Cabrol   | Glen Ellen                       |

## SILICA

| SILICA  |         |
|---|---------|
| Operator  | Product |
| <i>Contra Costa County</i><br>Hazel-Atlas Glass Co. of California, Ltd.<br>Silica Co. of California, Ltd. | b       |
| <i>Monterey County</i><br>Del Monte Properties—Att. C. S. Olmsted   | b       |
| <i>Riverside County</i><br>P. J. Weisel, Inc.   | b       |
| <i>San Bernardino County</i><br>Tennessee Clay Co.  | c       |
| <i>San Diego County</i><br>Standard Sanitary Mfg. Co., R. P. Jones, Mgr.                                  | a       |

a. Quartz. b. Glass sand. c. Quartzite.

## SILIMANITE-ANDALUSITE-CYANITE GROUP

| SILIMANITE-ANDALUSITE-CYANITE GROUP                             |            |
|---|------------|
| Operator  | Product    |
| <i>Imperial County</i><br>Vitreirax Co.                         | Kyanite    |
| <i>Mono County</i><br>Champion Spark Plug Co., Ceramic Division | Andalusite |

**SILVER**  
*Principal Silver Producers in California during 1937*

| Mine                           | Type of mine | Operator                      | Address                                 | Location of mines |
|--------------------------------|--------------|-------------------------------|---|-------------------|
| <i>Alpine County</i>           |              |                               |   |                   |
| Zaca                           | b            | Zaca Mining Corp.             | Markleeville                            | Markleeville      |
| <i>Amador County</i>           |              |                               |   |                   |
| Argonaut                       | *            | Argonaut Mining Co., Ltd.     | 1404 Humboldt Bank Bldg., San Francisco | Jackson           |
| Central Eureka & Old Eureka    | a            | Central Eureka Mining Co.     | 111 Sutter St., San Francisco           | Sutter Creek      |
| Kennedy                        | a            | Kennedy Mining & Milling Co.  | 519 California St., San Francisco       | Martell           |
| <i>Butte County</i>            |              |                               |   |                   |
| Surseease                      | a            | Hoefling Bros.                | 2801 C St., Sacramento                  | Yankee Hill       |
| <i>Calaveras County</i>        |              |                               |   |                   |
| Carson Hill                    | a            | Carson Hill Gold Mining Corp. | Melones                                 | Melones           |
| <i>El Dorado County</i>        |              |                               |   |                   |
| Big Canyon                     | a            | The Mountain Copper Co., Ltd. | 351 California St., San Francisco       | Shingle Springs   |
| <i>Imperial County</i>         |              |                               |   |                   |
| American Girl                  | a            | Secorro Mines, Inc.           | Box 12, Ogilby                          | Ogilby            |
| <i>Inyo County</i>             |              |                               |   |                   |
| Cardinal                       | a            | Cardinal Gold Mining Co.      | Bin D, Bishop                           | Bishop Creek      |
| Copper Queen                   | a            | Gold Bottom Mines, Inc.       | Box 1536, Bakersfield                   | Trona             |
| Darwin Lead                    | c            | Darwin Lead Co.               | Darwin                                  | Darwin            |
| Estelle                        | c            | Estelle Mines Corp.           | 972 S. 4th Ave., Los Angeles            | Keeler            |
| Golden Treasure                | c            | J. P. Madison & Ashford Bros. | Shoshone                                | Shoshone          |
| Keystone                       | c            | Darwin-Keystone, Ltd.         | Piru                                    | Darwin            |
| Opin                           | c            | C. O. Mittendorff             | Randsburg                               | Keeler            |
| Santa Rosa                     | c            | Santa Rosa Mines Dev. Co.     | Darwin                                  | Darwin            |
| Last Chance Claims             | c            | L. D. Foreman & Co.           |   |                   |
| <i>Kern County</i>             |              |                               |   |                   |
| Big Blue                       | a            | Kern Mines, Inc.              | Kernville                               | Kernville         |
| Cactus Queen                   | c            | Cactus Mines Co.              | Rosamond                                | Rosamond          |
| Elephant, Starlight & Lodestar | d            | Lodestar Mining Co.           | Box 235, Mojave                         | Mojave            |
| Golden Queen                   | a            | Golden Queen Mining Co.       | Mojave                                  | Mojave            |
| Karma                          | b            | E. L. Werman                  | Mojave                                  | Mojave            |
| Middle Butte                   | a            | Middle Butte Mines, Inc.      | Rosamond                                | Rosamond          |
| Tropico                        | a            | Burton Bros., Inc.            | Randsburg                               | Randsburg         |
| Yellow Aster                   | a            | Anglo-American Mining Corp.   |   |                   |

## SILVER

|   |                                      |  |   |   |
|---|--------------------------------------|--|---|---|
| <i>Marietta County</i><br>Mt. Gains<br>Pine Tree & Josephine  | a<br>a                               | Mt. Gains Mining Co.,<br>Pacific Mining Co.  | 183 N. Martel Ave., Los Angeles<br>Crocker Bldg., San Francisco   | Hornitos<br>Bear Valley   |
| <i>Mono County</i><br>Standard<br>Silverado & Kentuck   | a<br>b                               | Rosekip Mining Co.,<br>Sierra Consolidated Mines, Inc.   | 206 Sansome St., San Francisco<br>Wellington, Nev.  | Bodie<br>Sweetwater, Nev  |
| <i>Napa County</i><br>Fallsides   | b                                    | Coast Range Mining Co.   | Calistoga   | Calistoga   |
| <i>Nevada County</i><br>Empire Star Group<br>Golden Center<br>Idaho Maryland & Brunswick<br>Java Cap<br>Spanish                                 | a<br>a<br>a<br>a<br>a                | Empire Star Mines Co., Ltd.<br>Colony Butler<br>Idaho Maryland Mines Corp<br>Java Cap Mining Corp.<br>Bradley Mining Co.   | 14 Wall St., Rm. 1507, New York, N. Y.<br>Rowan Bldg., Los Angeles<br>Russ Bldg., San Francisco<br>Box 780, Nevada City<br>922 Crocker Bldg., San Francisco | Grass Valley<br>Grass Valley<br>Grass Valley<br>Nevada City<br>Washington                                       |
| <i>Placer County</i><br>Alabama<br>Auburn<br>Chicago  | a<br>a                               | Alabama California Gold Mines Co.,<br>Auburn Chicago Mines Corp.   | Box 155, Auburn<br>Citizens National Bank Bldg., Los Angeles  | Penryn<br>Penryn  |
| <i>Plumas County</i><br>Walker  | g                                    | Walker Mining Co.  | 821 Kearns Bldg., Salt Lake City, Utah  | Walkermine  |
| <i>Riverside County</i><br>Gold Crown   | a                                    | Gold Crown Mining Co., Ltd.  | 730 Petroleum-Security Bldg., Los Angeles   | Twenty-nine Palms   |
| <i>Sacramento County</i><br>Natomas   | e                                    | Natomas Co.  | Forum Bldg., Sacramento   | Natomas   |
| <i>San Bernardino County</i><br>Calico Tailings<br>Carlyle Group<br>Comanage<br>Imperial<br>Old Barber Mill<br>Santa Fe<br>Silver King<br>Venus | h<br>a<br>b<br>d<br>b<br>b<br>h<br>b | Edwin A. Bergman et al.<br>Carlyle Mining Co.<br>J. B. Osborn<br>Mojave Mining Co., Ltd.<br>Frank Royer<br>Simon Bacon<br>F. H. Lamley<br>A. H. Mayne<br>Harold E. Brown | 463 S. Clark Dr., Beverly Hills<br>Daggett<br>Ludlow<br>606 Hill St., Los Angeles<br>Barstow<br>Red Mountain<br>Barstow<br>Ludlow                           | Yermo<br>Twenty-nine Palms<br>Daggett<br>Ludlow<br>Red Mountain<br>Barstow<br>Red Mountain<br>Barstow<br>Ludlow |
| <i>Shasta County</i><br>Backbone<br>Iron Mountain   | a<br>a                               | Backbone Gold Mining Co., Ltd.<br>The Mountain Copper Co., Ltd.  | Kennett<br>351 California St., San Francisco  | Kennett<br>Matheson   |
| <i>Sierra County</i><br>Sixteen to One  | a                                    | Original 16 to 1 Mine, Inc.  | 1611 Russ Bldg., San Francisco  | Alleghany   |
| <i>Yuba County</i><br>Yuba Unit   | e                                    | Yuba Consolidated Gold Fields  | 351 California St., San Francisco   | Hammonton   |

a. Gold mine. b. Gold-silver mine. c. Lead-silver mine. e. Gold dredge. f. Silver-lead-zinc mine. g. Copper mine. h. Tailings dump.

| SLATE  |           | Address  | Location of quarry       |
|--|-----------|--|--------------------------|
| Operator   | Product   |  |                          |
| <i>Calaveras County</i><br>Pacific Slate Products Corp., Att. Hollis B. Peck-----                              | a, c      | Rittenhouse Bldg., Santa Cruz-----                             | Copperopolis             |
| <i>El Dorado County</i><br>Pacific Minerals Co., Ltd.-----<br>Geo. S. Pittcock & Son, Ltd., Losi Property----- | b<br>c    | 337 10th St., Richmond-----<br>1298 Hopkins St., Berkeley----- | Chili Bar<br>Placerville |
| <i>Inyo County</i><br>Mt. Whitney Slate Quarries, R. B. McIlroy-----<br>Red Slate Quarry, J. D. Leary-----     | b, c<br>c | Star R.F.D. No. 291, Lone Pine-----<br>Reeler-----             | Lone Pine<br>Keeeler     |
| <i>Los Angeles County</i><br>Blue Goose Quarry, Robert Cox-----  | c         | 1975 Lundy Ave., Pasadena-----                                 | Pasadena                 |
| <i>Tuolumne County</i><br>Whitney Slate Quarry, W. S. McLean Estate-----                                       | b         | 419 Bayshore Blvd., San Francisco-----                         | Hetch Hetchy             |

a. Roofing. b. Granules. c. Flagging.

## SOAPSTONE AND TALC

| Operator   | Product | Address   | Location of mine                    |
|--|---------|---|-------------------------------------|
| <i>Butte County</i><br>Mt. Lean Talc Deposit, W. S. McLean Est.-----   | a       | 419 Bayshore Blvd., San Francisco-----  | McLean Spur                         |
| <i>El Dorado County</i><br>Industrial Minerals & Chemical Co.-----<br>Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.-----   | a<br>a  | 836 Gilman St., Berkeley-----<br>337 10th St., Richmond-----  | Latrobe<br>Shrub                    |
| <i>Inyo County</i><br>Mt. Whitney Talc Deposit, Pacific Coast Talc Co.-----<br>Sierra Talc Co., Franklin Booth, Mgr.-----<br>Southern Calif. Minerals Co., W. S. Skeoch----- | b<br>b  | 2149 Bay St., Los Angeles-----<br>428 Union League Bldg., Los Angeles-----<br>320 Mission Rd., Los Angeles----- | Darwin<br>Keeler<br>Kingston Mt.    |
| <i>Los Angeles County</i><br>Binder Bros., W. H. Binder-----   | a       | 285 N. Lake Ave., Pasadena-----   | Bouquet Canyon                      |
| <i>San Bernardino County</i><br>Pacific Coast Talc Co.-----<br>Southern Calif. Minerals Co., W. S. Skeoch-----<br>Western Talc Co.-----                                      | b<br>b  | 2149 Bay St., Los Angeles-----<br>320 Mission Rd., Los Angeles-----<br>1901 E. 1st St., Los Angeles-----        | Silver Lake<br>Kingston Mt.<br>Aeme |

a. Soapstone. b. Talc.

## SODA

| Operator  | Product      | Address   | Location of plant  |
|---|--------------|---|--------------------|
| <i>Inyo County</i><br>Natural Soda Products Co.-----<br>Pacific Alkali Co.-----                   | a, b, d<br>a | 405 Montgomery St., San Francisco-----<br>1206 Pacific Mutual Bldg., Los Angeles----- | Keeler<br>Bartlett |
| <i>San Bernardino County</i><br>American Potash & Chemical Co.-----<br>West End Chemical Co.----- | a, c<br>a    | Trona-----<br>Latham Square Bldg., Oakland-----                                       | Trona<br>West End  |

a. Soda Ash. b. Sodium Bicarbonate. c. Salt Cake. d. Trona.

## DIRECTORY OF PRODUCERS

## STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

| Operator  | Product | Address                               | Location of pit or quarry |
|---|---------|---------------------------------------|---------------------------|
| <i>Alameda County</i>                           |         |                                       |                           |
| California Rock & Gravel Co.                    | a       | 500 Call Bldg., San Francisco         | Livermore                 |
| Farmers Land Co., Ltd.                          | a       | 922 A St., Hayward                    | Hayward                   |
| Heafey-Moore Co., Leona Quarry                  | b       | 344 High St., Oakland                 | Oakland                   |
| Henry L. Kaiser Co.                             | b       | 1522 Latham Square Bldg., Oakland     | Radum                     |
| Langdon Molding Sand & J. H. Langdon            | c       | R.F.D. Box 89, Niles                  | Decoto                    |
| Red Shale Quarry, W. S. McLean                  | d       | 419 Bayshore Blvd., San Francisco     | Arroyo Mocho              |
| Pacific Coast Aggregates, Inc.                  | a, b    | 85 2d St., San Francisco              | Eliot and Niles           |
| Alfred W. Petersen                              | a       | Box 943, Livermore                    | Livermore                 |
| Thos. B. Russell Quarry, T. B. Russell          | a       | 1192 Russell Way, Hayward             | Hayward                   |
| San Leandro Rock Co., Lake Chabot Quarry        | b       | 2486 Washington St., San Leandro      | Lake Chabot               |
| Southern Pacific R.R. Co., Asst. Chief Engineer | a, b    | Southern Pacific Bldg., San Francisco | Eliot, Niles, Radum       |
| <i>Butte County</i>                             |         |                                       |                           |
| Boethel-Kaiser Co., R. J. Kennedy, Mgr.         | a, b    | Oroville                              | Oroville                  |
| Cherokee Sand and Gravel Co., E. E. Meyers      | a       | R.F.D. 4, Box 127, Chico              | Cherokee Flat             |
| J. E. Johnson Rock Co.                          | b       | Weber Ave. and E St., Stockton        | Chico                     |
| McLean's Quarry, W. S. McLean                   | d       | 419 Bayshore Blvd., San Francisco     | McLean Spur               |
| Pacific Coast Aggregates, Inc.                  | s, b    | 85 2d St., San Francisco              | Oroville                  |
| <i>Calaveras County</i>                         |         |                                       |                           |
| Pacific Minerals Co., Ltd.                      | d       | 333 10th St., Richmond                | Angels                    |
| <i>Contra Costa County</i>                      |         |                                       |                           |
| Antioch Asphalt Sand Co.,                       | a       | 2008 Mission St., San Francisco       | Antioch                   |
| Bassett Rock Co.                                | a       | 8th St., Napa                         | Antioch                   |
| Blake Bros. Co., Anson Blake                    | b       | 204 Balboa Bldg., San Francisco       | Point Richmond            |
| Hutchinson Co., Stege Quarry                    | b       | 329 17th St., Oakland                 | Stege                     |
| Henry J. Kaiser Co.                             | a       | 1522 Latham Square Bldg., Oakland     | Newlove                   |
| Oak Point Sand Co., Robert P. Easley, et al.    | a       | Antioch                               | Antioch                   |
| Ed Roberts                                      | c       | Pittsburgh                            | Pittsburg                 |
| Silica Co. of Calif., Ltd.                      | c       | Brentwood                             | Brentwood                 |
| Southern Pacific R.R. Co., Asst. Chief Engineer | a       | Southern Pacific Bldg., San Francisco | Newlove                   |
| E. Stamm  | a       | Antioch                               | Antioch                   |
| <i>El Dorado County</i>                         |         |                                       |                           |
| Diamond Springs Lime Co.                        | b       | Diamond Springs                       | Diamond Springs           |

|  |      |  |
|--|------|--|
| <i>Fresno County</i>                         |      | Sanger   |
| Central Rock & Sand Co.                      | a, b | T. W. Patterson Bldg., Fresno                    |
| Grant-Service Rock Co., Cons.                | b    | 88 2d St., San Francisco                         |
| Pacific Coast Aggregates, Inc.               |      |  |
| <i>Glenn County</i>                          |      |  |
| Southern Pacific Co.                         | a    | 65 Market St., San Francisco                     |
| E. B. Bishop                                 | a    | Box 325, Orland                                  |
| <i>Humboldt County</i>                       |      |  |
| D. A. Boyd                                   | a    | R.F.D. Arcata                                    |
| Hemistreet & Bell                            | a    | 411 C St., Marysville                            |
| <i>Imperial County</i>                       |      |  |
| R. M. Albee                                  | a    | Holtville  |
| Imperial Rock Corp.                          | a    | 3232 E. 50th St., Vernon, Los Angeles            |
| <i>Inyo County</i>                           |      |  |
| Inyo Marble Co.                              | a    | 726-732 E. 29th St., Los Angeles                 |
| <i>Kern County</i>                           |      |  |
| American Minerals Co.                        | d    | 2808 S. Pacific, San Pedro                       |
| Bakersfield Rock and Gravel Co.              | a, b | Box 395, Station A, Bakersfield                  |
| Kern Rock Co., Ltd.                          | a, b | Box 1697, Bakersfield                            |
| G. A. Padfield                               | a    | 120 4th St., Bakersfield                         |
| <i>Lake County</i>                           |      |  |
| Chas. Kuppingger                             | a    | Lakeport   |
| <i>Lassen County</i>                         |      |  |
| Red River Lumber Co.                         | b    | Westwood   |
| <i>Los Angeles County</i>                    |      |  |
| Arrow Rock Co.                               | a    | Box 155, Monrovia                                |
| A. T. & S. F. R. I. L. Hubbard, Gen. Mgr.    | a    | 609 Kerckhoff Bldg., Los Angeles                 |
| Azusa Rock & Sand Co.                        | a, b | R.F.D. Azusa                                     |
| Richard P. Bell                              | a    | Box 233, Walteria                                |
| Blue Diamond Corp., Ltd.                     | a    | 1650 S. Alameda St., Los Angeles                 |
| Wm. J. Bonnead                               | g    | 2008 Laurel Canyon Rd., Los Angeles              |
| Chandler Palos Verdes S. & G. L. Chandler    | a, b | Lomita   |
| Consolidated Rock Products Co.               | a, b | 2730 S. Alameda St., Los Angeles                 |
| Ducey & Atwood Rock Co., R. K. Atwood, Pres. | a, b | Box 194, East Pasadena                           |
| Eaton Canyon Rock and Sand Co.               | a, b | 2350 E. Colorado St., Pasadena                   |
| Graham Bros.                                 | a, b | 713 N. Sepulveda, Brentwood Heights, Los Angeles |
| Granite Material Co.                         | g    | 3225 Fowler Ave., Los Angeles                    |
| Haines Canyon Rock Co., John M. Ferry        | a, b | 8200 Tujunga Ave., Roscoe                        |
|  |      | 5201 San Fernando, Glendale                      |

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo, e. Slag and volcanic cinder.

f. Tubemill pebbles. g. Decomposed granite.

## DIRECTORY OF PRODUCERS

## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

| Operator   | Product | Address   | Location of pit or quarry |
|--|---------|---|---------------------------|
| <i>Los Angeles County</i> —Continued                               |         |   |                           |
| Lindauer Corp.   | a       | Box 208, La Habra   | La Habra                  |
| Los Angeles Dept. of Water and Power.                              | a       | 207 S. Broadway, Los Angeles                                    | Los Angeles               |
| Los Angeles Decomposed Granite Co.                                 | g       | 2171 W. Washington, Los Angeles                                 | Los Angeles               |
| Pacific Rock & Gravel Co.  | a, b    | 458 S. Spring St., Los Angeles                                  | Los Angeles               |
| Reynolds Crushed Gravel  | b, g    | 920 N. Humphreys Ave., Los Angeles                              | Catalina Island           |
| Rohr-Connally Co.  | b       | 4351 Alhambra Ave., Los Angeles                                 | Catalina Island           |
| Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant.               | a       | McFarland and L Sts., Wilmington                                | Lomita                    |
| State Decomposed Granite Co.                                       | g       | 2472 Laurel Canyon Blvd., Los Angeles                           | Los Angeles               |
| West Slope Construction Co.  | b       | Azusa   | Anza                      |
| Wrigley Company  | b       | Avalon  | Catalina Island           |
| <i>Madera County</i>   |         |   |                           |
| Southern Pacific R.R. Co., Asst. Chief Engineer—<br>Stewart & Nuss | b       | Southern Pacific Bldg., San Francisco<br>410 Throne St., Fresno | Knowl's<br>Hendon         |
| <i>Marin County</i>  |         |   |                           |
| Daniels Const. Co., Hutchinson Co.                                 | b       | 503 Market St., San Francisco<br>329 17th St., Oakland          | San Rafael<br>San Quentin |
| <i>Marietta County</i>   |         |   |                           |
| Yosemite National Park   | a, b    | Yosemite  | Yosemite Nat'l Park       |
| <i>Mendocino County</i>  |         |   |                           |
| Henshaw & Ball,<br>Ukiah Gravel & Cement Co., John Freitas         | b       | 411 C St., Marysville   | Laytonville               |
| <i>Merced County</i>   |         |   |                           |
| Fred Baysiale,<br>Frank B. Marks                                   | a, b    | Ukiah   | Ukiah                     |
| <i>Mendo County</i>  |         |   |                           |
| Cline Porter   | b       | Merced  | Merced                    |
| <i>Mono County</i>   |         |   |                           |
| L. A. Bureau of Water Works and Supply                             | a       | Neiman  | Los Banos                 |
| <i>Madera Craters</i>  |         |   |                           |
| Del Monte Properties, C. S. Olmsted                                | a, c    | Alturas   | Alturas                   |
| M. J. Murphy   | b       | 207 S. Broadway, Los Angeles                                    | Mono Craters              |
| Pacific Coast Aggregates, Inc.                                     | a       |   |                           |
| S. Ruthven, Seaside Sand Pit                                       | a       |   |                           |
| Southern Pacific Co.   | a       |   |                           |
| <i>Del Monte</i>   |         |   |                           |
| Monte Verde and 9th Sts., Carmel                                   |         |   |                           |
| 55 2d St., San Francisco   |         |   |                           |
| Seaside  |         |   |                           |
| 66 Market St., San Francisco                                       |         |   |                           |

|  |      |                                  |                      |
|--|------|----------------------------------|----------------------|
| <i>Napa County</i>                                 |      |                                  |                      |
| Basalt Rock Co.                                    | b    | 8th St., Napa.                   |                      |
| Erington Quarry & Juarez Quarry                    | b    | Napa.                            |                      |
| M. L. Reidenbach                                   | a    | St. Helena.                      |                      |
| Thorsen Gravel Pit, Harry Thorsen                  |      |                                  |                      |
| <i>Nevada County</i>                               |      |                                  |                      |
| D. T. Brown  | b    | Grass Valley                     | Grass Valley         |
| <i>Orange County</i>                               |      |                                  |                      |
| Consolidated Rock Products Co.                     | a    | 2730 S. Alameda St., Los Angeles | Fullerton and Orange |
| Graham Bros. R.R. Co.                              | a, b | 3425 Fowler Ave., Los Angeles    | El Modena            |
| National Cement Pipe Co.                           | a    | Box 596, Santa Ana.              | Santa Ana            |
| B. A. Stoffel                                      | a    | Anaheim.                         | Anaheim              |
| Ralph Welch  | a    | 2609 W. Chapman St., Orange      | Orange               |
| <i>Placer County</i>                               |      |                                  |                      |
| Victor Wickman                                     | b    | Rocklin                          | Rocklin              |
| <i>Plumas County</i>                               |      |                                  |                      |
| Western Pacific R.R. Co., E. W. Mason, Gen. Sup't. | b    | Mills Bldg., San Francisco       |                      |
| <i>Riverside County</i>                            |      |                                  |                      |
| A. T. & S. F. R.R. Co., I. L. Hibbard, Gen. Mgr.   | b    | 609 Kerckhoff Bldg., Los Angeles | Corona               |
| John Johnson                                       | b    | Ferris                           | Peris                |
| Kuster & Waterburg                                 | a    | Corona                           | Corona               |
| Fay Massey   | a    | Indio                            | Indio                |
| Palo Verde Commercial Co.                          | a    | Blythe                           | Blythe               |
| City of Riverside                                  | a    | Riverside                        | Riverside            |
| Rohr-Connally Co., Ormond Quarry                   | b    | 4351 Valley Blvd., Los Angeles   | Bay Junction         |
| The Service Gravel Co., F. A. Braman               | b    | 4324 10th St., Riverside         | Riverside            |
| J. F. Shen Co., Inc.                               | a    | 617 S. Olive St., Los Angeles    | Banning              |
| P. J. Weisel, Industrial Sands                     | a, c | La Habra                         | Corona               |
| <i>Sacramento County</i>                           |      |                                  |                      |
| Brighton Sand & Gravel Co.                         | a, b | P.O. Box 2604, Sacramento        | Sacramento           |
| Cannon & Co. & Gravel Co.                          | c    | Box 281, Sacramento              | Ben Ali              |
| Del Paso Rock & Gravel Co.                         | a, b | H St. Rd., Sacramento            | Del Paso             |
| Folsom State Prison                                | b    | Represa                          | Represa              |
| Lord & Bishop                                      | a    | Native Sons Bldg., Sacramento    | American River       |
| Mucke Sand & Gravel Co.                            | a, b | 1433 57th St., Sacramento        | Mayhew               |
| Pacific Coast Aggregates, Inc.                     | a, b | 85 2d St., San Francisco         | Fair American River  |
| Perkins Gravel Co.                                 | a, b | Perkins                          | Perkins              |
| Robert Powell & Co.                                | a    | Box 815, Sacramento              | American River       |
| <i>San Benito County</i>                           |      |                                  |                      |
| Granite Rock Co.                                   | b    | Drawer M, Watsonville            | Logan                |
| Southern Pacific Co.                               | a, b | 65 Market St., San Francisco     | Logan                |

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

## DIRECTORY OF PRODUCERS

## STONE, MISCELLANEOUS—Continued

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| Operator   | Product | Address                               | Location of pit or quarry |
|--|---------|---------------------------------------|---------------------------|
| <i>San Bernardino County</i>                     |         |                                       |                           |
| A. T. & S. F. R.R.                               | a       | 609 Kerckhoff Bldg., Los Angeles      | Gale                      |
| Commercial Rock Co.                              | a, b    | 144th and Campus, Upland              | Upland                    |
| Consolidated Rock Products Co.                   | a       | 2750 S. Alameda St., Los Angeles      | La Verne                  |
| Hanawalt Bros.                                   | a       | 2151 D St., La Verne                  | San Bernardino            |
| Fourth Street Rock Crusher, A. O. Johnson        | a, b    | San Bernardino                        | Bastow                    |
| Pacific Minerals, Inc.                           | d       | 337 10th St., Richmond                | Redlands                  |
| Redlands Gravel Co.                              | a, b    | Redlands                              | San Bernardino            |
| San Bernardino Rock & Gravel Co.                 | a, b    | Box 249, San Bernardino               | Deleuzeville              |
| Southern Pacific R.R. Co., Asst. Chief Engineer  | a, b    | Southern Pacific Bldg., San Francisco | San Bernardino            |
| Triangle Rock & Gravel Co.                       | a, b    | San Bernardino                        | Oceanside                 |
| <i>San Diego County</i>                          |         |                                       |                           |
| Calaveras Materials Co.                          | b       | Oceanside                             | San Diego                 |
| Canyon Rock Co.                                  | a, b    | 3911 5th Ave., San Diego              | Oceanside                 |
| Crystal Silica Sand Co.                          | a       | 13th and Imperial Ave., San Diego     | San Diego                 |
| H. G. Fenton Material Co.                        | a       | 400 W. Nutmeg St., San Diego          | Chula Vista               |
| R. M. Hubbard                                    | c       | Box 832, Chula Vista                  | Oceanside                 |
| Nelson & Sloan                                   | a       | Carlsbad                              |                           |
| Oceanside Rock & Sand Co.                        | a       |                                       |                           |
| <i>San Francisco County</i>                      |         |                                       |                           |
| Mission Quarry Co.                               | b       | 210 Balboa Bldg., San Francisco       | San Francisco             |
| <i>San Joaquin County</i>                        |         |                                       |                           |
| G. F. Gilget                                     | a       | 205 W. Vine St., Stockton             | Stockton                  |
| Frank Marks                                      | a       | Newman                                | Tracy                     |
| Pacific Coast Aggregates, Inc.                   | a, b    | 86 2d St., San Francisco              | Riverbank                 |
| Santa Fe Sand and Gravel Co., W. A. Arlington    | a       | Box 271, Escalon                      | Escalon                   |
| Elmer J. Warner                                  | a       | 1128 E. Roosevelt St., Stockton       | Stockton                  |
| <i>San Luis Obispo County</i>                    |         |                                       |                           |
| Guiton Molding Sand, Harold E. Guiton            | c       | Oceano                                | Oceano                    |
| Walter B. Roselli                                | a       | 615 Grand Ave., San Luis Obispo       | San Luis Obispo           |
| Gularite Gravel Pit, M. Gularite                 | a       | Santa Margarita                       | Santa Margarita           |
| <i>San Mateo County</i>                          |         |                                       |                           |
| Golden West Quarry                               | b       | South San Francisco                   | South San Francisco       |
| Industrial Mineral Products, W. B. Vestal, Pres. | c       | 400 7th St., San Francisco            | Daly City                 |
| Market Street Ry. Co., Daly's Quarry             | b       | 58 Sutter St., San Francisco          | Daly City                 |

|  |      |                                       |                     |
|--|------|---------------------------------------|---------------------|
| <i>Santa Barbara County</i>                            |      |                                       |                     |
| Gates Gravel Plant, Frank H. Gates                     | a    | Santa Maria                           | Sisquoc             |
| <i>Santa Clara County</i>                              |      |                                       |                     |
| Carroll Gravel Pit, R. D. Carroll                      | a    | R.F.D. 4, Box 310A, San Jose          | San Jose            |
| Jas. A. Lemieux  | a    | Box 341, Senter Rd., San Jose         | San Jose            |
| Los Gatos Sand and Gravel Co.                          | a    | Los Gatos                             | Los Gatos           |
| Pacific Coast Aggregates Inc.                          | a    | 85 2d St., San Francisco              | Coyote and Campbell |
| Rhodes & Robinson, Stamford Quarry                     | b    | Box 325, Palo Alto                    | Palo Alto           |
| Henry Sand   | a    | 1018 Malone Rd., San Jose             | San Jose            |
| City of San Jose                                       | a    | San Jose                              | San Jose            |
| Southern Pacific Co.                                   | a    | 65 Market St., San Francisco          | Coyote              |
| Taaffe Construction Co.                                | b    | Los Altos                             | Los Altos           |
| <i>Santa Cruz County</i>                               |      |                                       |                     |
| Central Supply Co.                                     | a    | Box 524, Santa Cruz                   | Santa Cruz          |
| Henry J. Kaiser Co.                                    | a    | 1822 Latham Square Bldg., Santa Cruz  | Olympia             |
| Pacific Limestone Products Co.                         | b    | Santa Cruz                            | Santa Cruz          |
| <i>Shasta County</i>                                   |      |                                       |                     |
| Diestelhorst Gravel Plant, Chas. Diestelhorst          | a, b | 1040 Liberty St., Redding             | Redding             |
| Lassen Volcanic Nat'l Park                             | b    | Mineral via Red Bluff                 | Lassen Nat'l Park   |
| Oaks Gravel Plant, G. E. Oaks                          | a    | 1341 Yuba St., Redding                | Girvan              |
| Southern Pacific R.R. Co. Asst. Chief Engineer         | c    | Southern Pacific Bldg., San Francisco | Kennett             |
| <i>Sierra County</i>                                   |      |                                       |                     |
| Hemstreet & Bell                                       | b    | 411 C St., Marysville                 | Downieville         |
| <i>Siskiyou County</i>                                 |      |                                       |                     |
| King Solomon Mines Co.                                 | f    | Crocker Bldg., San Francisco          | Black Bear          |
| W. D. Miller Cons. Co.                                 | a    | Box 168, Klamath Falls, Ore.          | Graham Siding       |
| Southern Pacific R.R. Co., Asst. Chief Engineer        | e    | Southern Pacific Bldg., San Francisco | Regg                |
| A. Young   | a    | 345 N. Main St., Yreka                | Yreka               |
| <i>Solano County</i>                                   |      |                                       |                     |
| J. M. Nelson, Cordelia Quarry                          | b    | Cordelia                              | Cordelia            |
| <i>Sonoma County</i>                                   |      |                                       |                     |
| Basalt Rock Co.  | a    | 8th St., Napa                         | Healdsburg          |
| Hein Bros. Basalt Rock Co., Mark Hein, Pres.           | b    | Petaluma                              | Petaluma            |
| Petaluma and Santa Rosa, E. R. R., E. H. Maggard, Mgr. | b    | Petaluma                              | Stony Point         |
| Stony Point Quarry, W. A. Wilson                       | b    | Petaluma, Star Route                  | Stony Point         |
| <i>Stanislaus County</i>                               |      |                                       |                     |
| W. H. Hasan  | a    | Oakdale                               | Oakdale             |
| Frank B. Marks   | a    | Newman                                | Newman              |
| Oakdale Irrigation Dist.                               | a    | Oakdale                               | Oakdale             |
| Putman Sand & Gravel Co.                               | a    | Modesto                               | Modesto             |
| Rinehart Sand Pit, Rinehart Bros.                      | a    | Patterson                             | Crowe Landing       |
| J. P. Scanlon, Scanlon Gravel Pit                      | a    | 65 Market St., San Francisco          | Newman              |
| Southern Pacific Co.                                   | a    | Modesto                               | Modesto             |
| Chas. Warner   | a    |                                       |                     |

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tumbemill pebbles. g. Decomposed granite.

## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

| Operator   | Product   | Address   | Location of pit or quarry   |
|--|---|---|---|
| <i>Trinity County</i><br>S. Eastwood   | a   | Douglas City  | Douglas City  |
| <i>Tulare County</i><br>J. J. Dugan & Sons<br>O. C. Jeffers<br>Pacific Coast Aggregates, Inc.<br>Porterville Cement Pipe Co.   | a<br>a<br>a, b<br>a                                 | R.F.D. 2, Box 120, Porterville<br>Star Rt. 2, Porterville<br>85 2d St., San Francisco<br>Box 396, Porterville   | Porterville<br>Porterville<br>Lemon Cove and Lindsay<br>Porterville   |
| <i>Thomson County</i><br>Beerman & Jones   | b   | Soulsbyville  | Soulsbyville  |
| <i>Ventura County</i><br>G. W. Dryden<br>El Rio Rock Co.<br>Montalvo Rock Co.<br>Piru Rock Co.<br>Santa Paula Rock Co.<br>Saticoy Rock Products Co.<br>J. S. Toler<br>Southern Pacific Co. | b<br>a, b<br>a<br>a, b<br>a, b<br>a, b<br>c<br>a, b | Fillmore<br>Box 381, Ventura<br>Box 188, Montalvo<br>Piru<br>Willard Bridge, Santa Paula<br>Ventura<br>1257 Polk St., Ventura<br>65 Market St., San Francisco | Grimes Canyon<br>El Rio<br>Montalvo<br>Piru<br>Santa Paula<br>Saticoy-Ventura<br>Ventura<br>Rockbank and Chrisman |
| <i>Yolo County</i><br>Leroy Kerr<br>Frank Newman<br>Joe Schwarzenbauer<br>George Summers<br>Yolo Gravel Co.  | a<br>a<br>a<br>a<br>a                               | Yolo<br>Woodland<br>Woodland<br>Woodland<br>Box 7, Yolo   | Yolo<br>Woodland<br>Woodland<br>Woodland<br>Yolo  |
| <i>Yuba County</i><br>Hemstreet & Bell<br>N. F. Mahle<br>Pacific Coast Aggregates, Inc.<br>Yuba River Sand Co.   | a, b<br>a<br>a<br>a                                 | 501 11th St., Marysville<br>715 D St., Marysville<br>85 2d St., San Francisco<br>Marysville   | Marysville<br>Marysville<br>Marysville<br>Marysville  |

f. Tubemill pebbles. g. Decomposed granite. a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder.

| SULPHUR   |  | TUNGSTEN  |                                      |
|---|--|---|--------------------------------------|
| Operator  | Address  | Operator  | Address                              |
| <i>Los Angeles County</i><br>Sulphur Diggers, G. H. Burns, Mgr.<br>Sulphur Products Co. | 9172 Sunset Blvd., Hollywood<br>1427 E. 4th St., Los Angeles |   | Last Chance Mts.<br>Last Chance Mts. |
| <i>Inyo County</i><br>Pine Creek  |  | U. S. Vanadium Company, A. P. Cortelyou<br>Bishop | Bishop                               |
| Rossi   |  | Tungsten Company, A. T. Wilkerson                 | Bishop                               |
| Tungsten City   |  | El Diablo Mining Company, H. O. Johanson          | Bishop                               |
| Tungsten City   |  | Tungsten Milling Co., Raymond A. Stolle           | Bishop                               |
| <i>Kern County</i><br>Randsburg Winnie  |  | Jennie E. Daly                                    | Box 47, Cantl.                       |
|   |  |   | Randsburg                            |
| <i>San Bernardino</i><br>Atolia   |  | Atolia Mining Co.                                 | Atolia                               |
| Adelanto  |  | Nicholas Baxter                                   | Adelanto                             |
| <i>Tulare County</i><br>Tungsten  |  | Tungsten Mines                                    | Possey                               |
|   |  |   | 929 American Ave., Long Beach        |

**ZINC**  
*Producers of Zinc in California during 1937*

| Mine                            | Operator        | Address | Location of mine |
|---------------------------------|-----------------|---------|------------------|
| <i>Inyo County</i><br>Thorndyke | Johnson & Young | Trona   | Trona            |
| <i>San Bernardino County</i>    | C. A. Simons    | Needles | Needles          |

**ZIRCON**

| Mine                                    | Operator                         | Address                    | Location of mine |
|---|----------------------------------|----------------------------|------------------|
| <i>Placer County</i><br>Kaufield Dredge | F. L. Newsome and E. M. Kaufield | 533 23d Ave, San Francisco | Lincoln          |

## APPENDIX

## MINING BUREAU ACT

Chap. 670 [Stats. 1913]; amended, Chap. 280 [Stats. 1929]; amended, Chap. 748 [Stats. 1933].

An act establishing a state mining bureau, creating the office of state mineralogist, fixing his salary and prescribing his powers and duties; providing for the employment of officers and employees of said bureau, making it the duty of persons in charge of mines, mining operations and quarries to make certain reports, providing for the investigation of mining operations, dealings and transactions and the prosecution for defrauding, swindling and cheating therein, creating a state mining bureau fund for the purpose of carrying out the provisions of this act and repealing an act entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all acts amendatory thereof and supplemental thereto or in conflict herewith.

[Approved June 16, 1913. In effect August 10, 1913.]

[Amendment (Sec. 16) approved May 14, 1929. In effect August 14, 1929.]

[Amendment (Sec. 10) approved June 5, 1933. In effect August 21, 1933.]

*The people of the State of California do enact as follows:*

SECTION 1. There is hereby created and established a state mining bureau. The chief officer of such bureau shall be the state mineralogist, which office is hereby created.

SEC. 2. It shall be the duty of the governor of the State of California and he is hereby empowered to appoint a citizen and resident of this state, having a practical and scientific knowledge of mining, to the office of state mineralogist. Said state mineralogist shall hold his office at the pleasure of the governor. He shall be a civil executive officer. He shall take and subscribe the same oath of office as other state officers. He shall receive for his services a salary of three hundred dollars (\$300) per month, to be paid at the same time and in the same manner as the salaries of other state officers. He shall also receive his necessary traveling expenses when traveling on the business of his office. He shall give bond for the faithful performance of his duties in the sum of ten thousand dollars (\$10,000), said bond to be approved by the governor of the State of California.

SEC. 3. Said state mineralogist shall employ competent geologists, field assistants, qualified specialists and office employees when necessary in the execution of his plans and operations of the bureau, and fix their compensation. The said employees shall be allowed their necessary traveling expenses when traveling on the business of said department and shall hold office at the pleasure of said state mineralogist.

SEC. 4. It shall be the duty of said state mineralogist to make, facilitate, and encourage, special studies of the mineral resources and mineral industries of the state. It shall be his duty: to collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use; to make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance, such collection constituting the museum of the state mining bureau; to provide a library of books, reports, drawings, bearing upon the mineral industries, and sciences of mineralogy and geology, and arts of mining and metallurgy, such library constituting the library of the state mining bureau; to make a collection of models, drawings and descriptions of the mechanical appliances used in mining and metallurgical processes; to preserve and so maintain such collections

and library as to make them available for reference and examination, and open to public inspection at reasonable hours; to maintain, in effect, a bureau of information concerning the mineral industries of this state, to consist of such collections and library, and to arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it; to issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this state.

SEC. 5. It is hereby made the duty of the owner, lessor, lessee, agent, manager or other person in charge of each and every mine, of whatever kind or character, within the state, to forward to the state mineralogist, upon his request, at his office not later than the thirty-first day of March, in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men then employed, the method of working such mine and the general condition thereof, the total mineral production for the past year, and such owner, lessor, lessee, agent, manager or other person in charge of any mine within the state must furnish whatever information relative to such mine as the state mineralogist may from time to time require for the proper discharge of his official duties. Any owner, lessor, lessee, agent, manager or other person in charge of each and every mine of whatever kind or character within the state, who fails to comply with the above provisions shall be deemed guilty of a misdemeanor.\*

SEC. 6. The state mineralogist now performing the duties of the office of state mineralogist shall perform the duties of the office of state mineralogist as in this act provided until the appointment and qualification of his successor as in this act provided.

SEC. 7. The said state mineralogist shall take possession, charge and control of the offices now occupied and used by the board of trustees and state mineralogist and the museum, library and laboratory of the mining bureau located in San Francisco as provided for by certain act of the legislature approved March 23, 1893, and hereafter referred to in section fourteen hereof, and shall maintain such offices, museum, library and laboratory for the purposes provided in this act.

SEC. 8. Said state mineralogist or qualified assistant shall have full power and authority at any time to enter or examine any and all mines, quarries, wells, mills, reduction works, refining works and other mineral properties or working plants in this state in order to gather data to comply with the provisions of this act.

SEC. 9. The state mineralogist shall make a biennial report to the governor on or before the fifteenth day of September next preceding the regular session of the legislature.

SEC. 10. All moneys received by the State Mining Bureau (or State Division of Mines) or any officer thereof, from sales of publications issued by said bureau, shall be deposited at least once each month in the State treasury to the credit of a fund which is hereby created and designated "Division of mines revolving printing fund." Said fund shall be used and is hereby appropriated for the use of said bureau in addition to such other funds as may be from time to time appropriated by the Legislature, for the printing and publishing of reports, bulletins, and maps issued by the said bureau. The State Controller is authorized to require financial reports from the State Mining Bureau or any officer thereof.

SEC. 11. The said state mineralogist is hereby authorized and empowered to receive on behalf of this state, for the use and benefit of the state mining bureau, gifts, bequests, devises and legacies of real or other property and to use the same in accordance with the wishes of the donors, and if no instructions are given by said donors, to manage, use, and dispose of the gifts and bequests and legacies for the best interests of said state mining bureau and in such manner as he may deem proper.

SEC. 12. The state mineralogist may, whenever he deems it advisable, prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the state.

SEC. 13. The state mineralogist is hereby empowered to fix a price upon and to dispose of to the public, at such price, any and all publications of the state mining bureau, including reports, bulletins, maps, registers or other publications, such price shall approximate the cost of publication and distribution. Any and all sums derived from such disposition, or from gifts or bequests made, as hereinbefore pro-

\* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

vided, must be accounted for by said state mineralogist and turned over to the state treasurer to be credited to the mining bureau fund as provided for in section ten. He is also empowered to furnish without cost to public libraries the publications of the bureau and to exchange publications with other geological surveys and scientific societies, etc.

SEC. 14. The state mineralogist provided for by this act shall be the successor in interest of the board of trustees of the state mining bureau, and the state mineralogist, under and by virtue of that certain act, entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management, and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all books, papers, documents, personal property, records, and property of every kind and description obtained or possessed, or held or controlled by the said board of trustees of the said state mining bureau, and the state mineralogist, and the clerks and employees thereof, under the provisions of said act of March 23, 1893, or any act supplemental thereto or amendatory thereof, shall immediately be turned over and delivered to the said state mineralogist herein provided for, who shall have charge and control thereof.

SEC. 15. That certain act entitled, "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, and to provide for the appointment, duties and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction, and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, together with all acts amendatory thereof and supplemental thereto and all acts in conflict herewith are hereby repealed.

SEC. 16. For the purpose of this act and as used herein the term "mine" is hereby defined to embrace and include all mineral bearing properties of whatever kind or character whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained, and the term "mineral" for the purposes of this act and whenever so used shall embrace and include any and all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

## DEPARTMENT OF NATURAL RESOURCES ACT

Chap. 128 [Stats. 1927]; amended, Chap. 307 [Stats. 1929.]

An act to add a new article to chapter three of title one of part three of the Political Code to be numbered article two *j*, embracing sections three hundred seventy-three to three hundred seventy-three *i*, relating to a department of natural resources.

[Approved by the Governor April 13, 1927.]

[Amendment approved May 18, 1929.]

*The people of the State of California do enact as follows:*

SECTION 1. The Political Code is hereby amended by adding a new article to chapter III of title I of part III thereof, to be numbered article II*j*, embracing sections 373 to 373*i* and to read as follows:

ARTICLE II*j*.

## DEPARTMENT OF NATURAL RESOURCES

373. A department of the government of the State of California to be known as the department of natural resources is hereby created. The department shall be conducted under the control of an executive officer to be known as the director of natural resources, which office is hereby created. The director shall be appointed by and hold office at the pleasure of the governor and shall receive a salary of six thousand dollars per annum.

Except as in this article otherwise provided, the provisions of article II of this chapter, title, and part of the Political Code as adopted at the forty-fourth session of the Legislature and as the same may be amended from time to time, shall govern and apply to the conduct of the department of natural resources in every respect the same as if such provisions were herein set forth at length and wherever in said article II the term "head of the department" or similar designation occurs, the same shall for the purposes of this article mean the director of natural resources.

373a. For purposes of administration the department shall be forthwith organized by the director thereof, subject to the approval of the governor, in such manner as he shall deem necessary to properly segregate and conduct the work of the department, and the director shall have power to appoint, in accordance with the civil service and other provisions of law, such deputies, officers and other expert and clerical assistants as may be necessary. The work of the department is hereby divided into at least four divisions to be known as the division of forestry, the division of parks, the division of fish and game, and the division of mines.

373b. The division of mines shall be administered through a chief who shall be appointed by the director of natural resources upon the nomination of the state mining board, the chief to be a technically trained mining engineer and to be known as the state mineralogist; such chief shall receive a salary of six thousand dollars per annum. General policies for the guidance of the division of mines shall be determined by a board to be known as the state mining board, which shall consist of five members appointed by and to hold office at the pleasure of the governor.

373c. The division of forestry shall be administered through a chief of division who shall be known as the state forester, who shall be a technically trained forester, appointed by the director of natural resources upon nomination by the state board of forestry hereinafter provided. General policies for the guidance of the division of forestry shall be determined by a state board of forestry which shall consist of seven members appointed by and holding office at the pleasure of the governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with the live stock industry, one with general agriculture and one with the problems of water conservation.

373d. The division of parks shall be administered through a chief of division who shall be appointed by the director of natural resources upon nomination by the state park commission hereinafter provided. General policies for the administration of the state park system shall be determined by the state park commission which is hereby created to consist of five members appointed by the governor and holding office at his pleasure.

373e. The division of fish and game shall be administered through a fish and game commission consisting of three members appointed by and holding office at the pleasure of the governor.

373f. The chiefs of the divisions of forestry and parks respectively shall receive such salaries as may be determined by the director with the approval of the governor. The director of natural resources and the chief of each division before entering upon his duties shall execute to the State of California an official bond in the penal sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties. The members of the board of forestry, the state parks commission and fish and game commission shall serve without compensation, but shall be entitled to their actual expenses incurred in the performance of their duties.

373g. The department of natural resources shall succeed to and is hereby invested with all the duties, powers, purposes, responsibilities and jurisdiction of the state mining bureau, state mineralogist, department of petroleum and gas, state oil and gas supervisor, state forester, state board of forestry, California redwood park commission, San Pasqual battlefield commission, Mount Diablo park commission, state fish and game commission, state fish and game commissioners, and, except as herein otherwise provided, of the several officers, deputies and employees of such bodies and offices, and whenever by the provisions of any statute or law now in force or that may hereafter be enacted a duty or jurisdiction is imposed or authority conferred upon any of said officers, offices, bodies, deputies or employees by any statute the enforcement of which is transferred to the department, such duty, jurisdiction and authority are hereby imposed upon and transferred to the department of natural resources and the appropriate officers thereof with the same force and effect as though the title of said department of natural resources had been specifically set forth and named therein in lieu of the name of any such body, office, officer, deputy or employee. Said bodies and offices, the duties, powers, purposes, responsibilities and jurisdiction of which are so transferred and vested in the department of natural resources, and the positions of all officers, deputies and employees thereunder, are and each of them is hereby abolished and shall have no further legal existence, but the statutes and laws under which they existed and all laws prescribing their duties, powers, purposes, responsibilities and jurisdiction, together with all lawful rules and regulations established thereunder are hereby expressly continued in force.

The department of natural resources shall be in possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property real or personal now or hereafter held for the benefit or use of said bodies, offices and officers.

The boards of district oil and gas commissioners, the offices of district oil and gas commissioners and the board of review, correction and equalization created by the act approved June 10, 1915, establishing the department of petroleum and gas, are hereby respectively continued in force with the powers, duties, responsibilities and jurisdiction in them vested by the provisions of said act approved June 10, 1915, as amended; *provided*, that said board of review shall consist of the director of natural resources, the director of finance and the chairman of the state board of equalization.

373h. The management and control of the property acquired by the State of California under or pursuant to the provisions of the act entitled "An act to accept the gift to the state of San Pasqual battlefield in San Diego county, to provide for collecting and systematizing the history of said battle, for determining the exact location thereof, and to report a suitable method of marking said battlefield and commemorating the heroism of those Americans who fought and died there," approved May 11, 1919, is hereby transferred to and vested in the department of natural resources.

373i. From and after the date upon which this act takes effect, the department of natural resources shall be and is hereby authorized and empowered to expend the moneys in any appropriation or in special fund in the state treasury now remaining or made available by law for the administration of the provisions of all the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office or officer whose duties, powers, and functions are, by the provisions of this article, transferred to and conferred upon the department of natural resources. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which such appropriations were made or such special funds created.

PUBLICATIONS OF THE DIVISION OF MINES

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During the past fifty-six years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available for reference, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Taft, Bakersfield, Coalinga. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained postpaid by addressing any of the above offices and enclosing the requisite amount in the case of publications that have a list price. Only coin, stamps or money orders should be sent, and it will be appreciated if remittance is made in this manner rather than by personal check.

Money orders should be made payable to the Division of Mines.

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NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

## REPORTS

Asterisks (\*\*) indicate the publication is out of print.

## PRICES SUBJECT TO CHANGE. WRITE FOR LATEST PRICE LIST

|   | Price<br>Postpaid |
|---|-------------------|
| **First Annual Report of the State Mineralogist, 1880, 43 pp. Henry G. Hanks -----  |                   |
| **Second Annual Report of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks -----   |                   |
| **Third Annual Report of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks -----  |                   |
| **Fourth Annual Report of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks -----  |                   |
| **Fifth Annual Report of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks -----  |                   |
| Sixth Annual Report of the State Mineralogist, Part I, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks -----  | \$0.75            |
| Part II, 1887, 222 pp., 36 illustrations. William Irelan, Jr. -----   | .75               |
| **Seventh Annual Report of the State Mineralogist, 1887, 315 pp. William Irelan, Jr. -----  |                   |
| **Eighth Annual Report of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr. -----   |                   |
| **Ninth Annual Report of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr. -----   |                   |
| **Tenth Annual Report of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr. -----   |                   |
| Eleventh Report (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Irelan, Jr. -----   | 1.50              |
| **Twelfth Report (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford -----   |                   |
| **Thirteenth Report (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford -----   |                   |
| Chapters of the State Mineralogist's Report XIV, Biennial Period, 1913-1914, Fletcher Hamilton: -----   |                   |
| **Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper -----  |                   |
| Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper -----   | .75               |
| **Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper -----  |                   |
| **Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper -----   |                   |
| **Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper -----  |                   |
| **Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper -----  |                   |
| Fourteenth Report of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915: -----  |                   |
| **A General report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth ----- |                   |
| Chapters of the State Mineralogist's Report XV, Biennial Period, 1915-1916 Fletcher Hamilton: -----   |                   |
| **Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper -----   |                   |
| **Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper -----  |                   |
| Mines and Mineral Resources, El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper -----  | .75               |

## REPORTS—Continued

Asterisks (\*\*) indicate the publication is out of print.

|  | Price<br>Postpaid |
|--|-------------------|
| Mines and Mineral Resources, Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper-----  | \$0.75            |
| **Mines and Mineral Resources, Los Angeles, Orange and Riverside Counties, 136 pp., paper-----   | -----             |
| **Mines and Mineral Resources, San Bernardino and Tulare Counties, 186 pp., paper-----   | -----             |
| **Fifteenth Report of the State Mineralogist, for the Biennial Period 1915-1916, Fletcher Hamilton, 1917:  | -----             |
| A General Report on the Mines and Mineral Resources of Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare Counties, 990 pp., 413 illustrations, cloth----- | -----             |
| Chapters of the State Mineralogist's Report XVI, Biennial Period, 1917-1918, Fletcher Hamilton:  | -----             |
| Mines and Mineral Resources of Nevada County, 270 pp., paper-----  | 1.00              |
| Mines and Mineral Resources of Plumas County, 188 pp., paper-----  | .75               |
| Mines and Mineral Resources of Sierra County, 144 pp., paper-----  | .75               |
| Seventeenth Report of the State Mineralogist, 1920, 'Mining in California during 1920,' Fletcher Hamilton; 562 pp., 71 illustrations, cloth-----   | 2.50              |
| Eighteenth Report of the State Mineralogist, 1922, 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:   | -----             |
| **January, **February, March, April, **May, June, July, August, September, October, November, December, 1922-----  | .40               |
| Chapters of Nineteenth Report of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923-----   | .40               |
| Chapters of Twentieth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, October, 1924, per copy 30¢; July, per copy-----   | .40               |
| Chapters of Twenty-first Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:   | -----             |
| January, 1925, Mines and Mineral Resources of Sacramento, Monterey and Orange Counties-----  | .40               |
| April, 1925, Mines and Mineral Resources of Calaveras, Merced, San Joaquin, Stanislaus and Ventura Counties-----   | .40               |
| **July, 1925, Mines and Mineral Resources of Del Norte, Humboldt and San Diego Counties-----   | -----             |
| **October, 1925, Mines and Mineral Resources of Siskiyou, San Luis Obispo and Santa Barbara Counties-----  | -----             |
| Chapters of Twenty-second Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:  | -----             |
| **January, 1926, Mines and Mineral Resources of Trinity and Santa Cruz Counties-----   | -----             |
| April, 1926, Mines and Mineral Resources of Shasta, San Benito and Imperial Counties-----  | .40               |
| July, 1926, Mines and Mineral Resources of Marin and Sonoma Counties-----  | .40               |
| **October, 1926, Mines and Mineral Resources of El Dorado and Inyo Counties, also report on Minaret District, Madera County-----   | -----             |
| Chapters of Twenty-third Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:   | -----             |
| January, 1927, Mines and Mineral Resources of Contra Costa County; Santa Catalina Island-----  | .40               |
| April, 1927, Mines and Mineral Resources of Amador and Solano Counties-----  | .40               |
| **July, 1927, Mines and Mineral Resources of Placer and Los Angeles Counties-----  | -----             |
| October, 1927, Mines and Mineral Resources of Mono County-----   | .40               |
| Chapters of Twenty-fourth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:  | -----             |
| January, 1928, Mines and Mineral Resources of Tuolumne County-----   | .40               |

## REPORTS—Continued

Asterisks (\*\*) indicate the publication is out of print.

|   | Price<br>Postpaid |
|---|-------------------|
| April, 1928, Mines and Mineral Resources of Mariposa County-----  | \$0.40            |
| July, 1928, Mines and Mineral Resources of Butte and Tehama Counties-----   | .40               |
| October, 1928, Mines and Mineral Resources of Plumas and Madera Counties-----   | .40               |
| Chapters of Twenty-fifth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:  |                   |
| **January, 1929, Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines-----   |                   |
| **April, 1929, Mines and Mineral Resources of Sierra, Napa, San Francisco and San Mateo Counties-----   |                   |
| July, 1929, Mines and Mineral Resources of Colusa, Fresno and Lake Counties-----  | .40               |
| October, 1929, Mines and Mineral Resources of Glenn, Alameda, Mendocino and Riverside Counties-----   | .40               |
| Chapters of Twenty-sixth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:  |                   |
| January, 1930, Mines and Mineral Resources of Santa Clara County; also Barite in California-----  | .40               |
| **April, 1930, Mines and Mineral Resources of Nevada County; also Mineral Paint Materials in California-----  |                   |
| **July, 1930, Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California-----   |                   |
| October, 1930, Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary)-----   | .40               |
| Chapters of Twenty-seventh Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:  |                   |
| January, 1931, Preliminary Report of Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline Talc. Decorative Effects in Concrete-----   | .40               |
| April, 1931, Stratigraphy of the Kreyenhagen Shale. Diatoms and Silicoflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyenhagen Shale. Geology of Santa Cruz Island-----  | .40               |
| **July, 1931. (Yuba, San Bernardino.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining-----   |                   |
| October, 1931. (Alpine.) Geology of the San Jacinto Quadrangle south of San Gorgonio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931-----  | .40               |
| Chapters of Twenty-eighth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:   |                   |
| January, 1932, Economic Mineral Deposits of the San Jacinto Quadrangle. Geology and Physical Properties of Building Stone from Carmel Valley. Contributions to the Study of Sediments. Sediments of Monterey Bay. Sanbornite-----   |                   |
| **April, 1932. Elementary Placer Mining Methods and Gold Saving Devices. The Pan, Rocker and Sluice Box. Prospecting for Vein Deposits. Bibliography of Placer Mining-----  | .40               |
| Abstract from April quarterly: Elementary Placer Mining Methods and Gold Saving Devices. Types of Deposits, Simple Equipment. Special Machines. Dry Washing. Black Sand Treatment. Marketing of Products. Placer Mining Areas. Laws. Prospecting for Quartz Veins. Bibliography (mimeographed)-----   | .25               |
| July-October. (Ventura.) Report accompanying Geologic Map of Northern Sierra Nevada. Fossil Plants in Auriferous Gravels of the Sierra Nevada. Glacial and Associated Stream Deposits of the Sierra Nevada. Jurassic and Cretaceous Divisions in the Knoxville-Shasta Succession of California. Geology of a Part of the Panamint Range. Economic Report of a Part of the Panamint Range. Acquiring Mining Claims Through Tax Title. The Biennial Report of State Mineralogist----- | .75               |

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| Chapters of Report XXIX, 1933 (quarterly: titled 'California Journal of Mines and Geology,' containing the following:   |        |
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| Chapters of Report XXXI, 1935 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:  |        |
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\*\*Bulletin No. 11. Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties, by W. L. Watts. 1897, 94 pp., 6 maps, 31 illustrations-----

\*\*Bulletin No. 12. Mineral Production of California, by Counties, for 1896, by Charles G. Yale. Tabulated sheet-----

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\*\*Bulletin No. 20. Synopsis of General Report of State Mining Bureau, by W. L. Watts. 1901, 21 pp. This bulletin contains a brief statement of the progress of the mineral industry in California for the four years ending December, 1899-----

\*\*Bulletin No. 21. Mineral Production of California by Counties, by Charles G. Yale. 1900. Tabulated sheet-----

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| Bulletin No. 77. Catalogue of Publications of California State Mining Bureau, 1880-1917, by E. S. Boalich. 44 pp., paper   | Free              |
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## PRELIMINARY REPORTS

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| **Preliminary Report No. 2. Notes on Damage by Water in California Oil Fields, March, 1914. By R. P. McLaughlin. 4 pp.-----   | ----- |
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| **Preliminary Report No. 5. Antimony, Graphite, Nickel, Potash, Strontium and Tin. By E. S. Boalich and W. O. Castello. 1918, 44 pp. Paper-----                                       | ----- |
| **Preliminary Report No. 6. A Review of Mining in California During 1919. By Fletcher Hamilton. 1920, 43 pp. Paper-----   | ----- |
| **Preliminary Report No. 7. The Clay Industry in California. By E. S. Boalich, W. O. Castello, E. Huguenin, C. A. Logan, and W. B. Tucker. 1920, 102 pp. 24 illustrations. Paper----- | ----- |
| **Preliminary Report No. 8. A Review of Mining in California During 1921, with Notes on the Outlook for 1922. By Fletcher Hamilton. 1922, 68 pp. Paper-----                           | ----- |

## MISCELLANEOUS PUBLICATIONS

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| **Catalogue of books, maps, lithographs, photographs, etc., in the library of the State Mining Bureau at San Francisco, May 15, 1884. 19 pp.-----                    | ----- |
| **Catalogue of the State Museum of California, Volume II, being the collection made by the State Mining Bureau from April 16, 1881, to May 5, 1884. 220 pp.-----     | ----- |
| **Catalogue of the State Museum of California, Volume III, being the collection made by the State Mining Bureau from May 15, 1884, to March 31, 1887. 195 pp.-----   | ----- |
| **Catalogue of the State Museum of California, Volume IV, being the collection made by the State Mining Bureau from March 30, 1887, to August 20, 1890. 261 pp.----- | ----- |
| **Catalogue of the Library of the California State Mining Bureau, September 1, 1892. 149 pp.-----  | ----- |
| **Catalogue of West North American and Many Foreign Shells with Their Geographical Ranges, by J. G. Cooper. Printed for the State Mining Bureau, April, 1894-----    | ----- |
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## MAPS

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**DETERMINATION OF MINERAL SAMPLES**

Samples (limited to two at one time) of any mineral found in the State may be sent to the Division of Mines for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the State. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.



## INDEX

|   | Page                   |
|---|------------------------|
| Agricultural limestone  | 82                     |
| Alameda County  | 103                    |
| Alpine County   | 104                    |
| Aluminum  | 26                     |
| Amador County   | 104                    |
| Amblygonite   | 83                     |
| American Petroleum Institute, cited                             | 25                     |
| Andalusite  | 90                     |
| Antimony  | 26-27                  |
| Appendix  | 175-195                |
| Architectural terra cotta                                       | 76                     |
| Arsenic   | 27                     |
| Art pottery   | 76                     |
| Asbestos  | E<br>70                |
| Ash, volcanic   | 87                     |
| Asphalt   | 51                     |
| Bancroft, H. H., cited  | 35                     |
| Barite  | 70-71                  |
| duty on   | 71                     |
| producers   | 130                    |
| total production  | 71                     |
| Ballast, railroad   | 67                     |
| Bauxite   | 26                     |
| Bentonite   | 71-72                  |
| producers   | 130                    |
| total production  | 72                     |
| Beryl   | 28                     |
| Beryllium   | 27-28                  |
| Bismuth   | 28                     |
| Bituminous rock   | 52                     |
| producers   | 130                    |
| total production  | 52                     |
| Borates   | 94-95                  |
| exports   | 95                     |
| producers   | 130                    |
| production, 1864-1937   | 95                     |
| Bradley, Walter W., cited                                       | 34, 35, 44, 65, 74, 86 |
| Brick   | 53-54                  |
| producers   | 134-137                |
| production of various kinds                                     | 53                     |
| total production, 1893-1937                                     | 54                     |
| Bromine   | 96                     |
| producer  | 131                    |
| Brown, J. R., cited   | 31, 36                 |
| Building stone, ( <i>See Granite, Marble, Sandstone, etc.</i> ) |                        |
| Bulletins, list of  | 187-191                |
| Butte County  | 105                    |
| Cadmium   | 28                     |
| Calaveras County  | 105                    |
| Calcium chloride  | 96                     |
| producer  | 131                    |
| silicate  | 72-73                  |
| California, area of   | 102                    |
| Oil and Gas Association   | 19                     |
| Carbon dioxide gas (natural) produced                           | 73                     |
| producers   | 132                    |
| Carmel stone  | 61                     |
| Casinghead gas  | 18                     |
| Celestite   | 92                     |
| Cement  | 54-55                  |
| natural   | 55                     |
| producers   | 132                    |
| total production  | 55                     |
| Chemical stoneware  | 76                     |
| Chimney pipe  | 76                     |
| Chinaware   | 76                     |
| Chromite  | 28-29                  |
| imports of  | 29                     |
| occurrence of   | 29                     |
| producers   | 133                    |
| total production  | 29                     |
| Clay for oil well drilling mud                                  | 76                     |
| Clay, pottery   | 73-76                  |
| producers   | 134-137                |

|   | Page        |
|---|-------------|
| Clay, pottery—Continued   |             |
| production, 1887-1937   | 76          |
| products  | 76          |
| uses of, other than for pottery                                   | 75          |
| Coal  | 15-16       |
| producers   | 138         |
| total production of   | 16          |
| Cobalt  | 30          |
| Cogemanite  | 95          |
| Colusa County   | 106         |
| Concrete, rock for  | 67          |
| Conduit   | 76          |
| Contra Costa County   | 106         |
| Copper  | 30-31       |
| producers   | 138         |
| production, 1882-1937   | 31          |
| United States, production of                                      | 31          |
| Counties, mineral production of                                   | 13, 102-127 |
| Cronise, T. F., cited   | 86          |
| Crushed rock  | 66-67       |
| producers   | 166-172     |
| Curying   | 54          |
| Del Norte County  | 106         |
| Department of Natural Resources Act                               | 178-179     |
| Determination of mineral samples                                  | 195         |
| Diatomaceous earth. ( <i>See</i> diatomite.)                      |             |
| Diatomite   | 77          |
| producers   | 139         |
| total production of   | 77          |
| Directory of producers  | 129-174     |
| Dolomite  | 78          |
| producers   | 139         |
| total production  | 78          |
| Drain tile  | 76          |
| Dredge of Junction City Mining Co., Photo of                      | 35          |
| Dumortierite  | 90          |
| Duty on barytes   | 71          |
| fuller's earth  | 72          |
| glass sand  | 90          |
| magnesite   | 58          |
| manganese   | 40          |
| molybdenum  | 41          |
| soapstone and talc  | 91          |
| tungsten  | 49          |
| El Dorado County  | 107         |
| Electric smelting of ferro alloys                                 | 37          |
| Electrical porcelain  | 76          |
| Eng. and Min. Jour., cited  | 39, 41      |
| Exports of borates  | 95          |
| Faience tile  | 76          |
| Feldspar  | 78-79       |
| producer  | 140         |
| total production  | 79          |
| Ferro-chrome by electric furnace                                  | 37          |
| -manganese by electric furnace                                    | 37          |
| -silicon by electric furnace                                      | 37          |
| Fertilizers. ( <i>See</i> Gypsum, Limestone, Phosphates, Potash.) |             |
| Fire brick  | 53          |
| clay  | 76          |
| Flue linings  | 76          |
| Fluorspar   | 79          |
| producer  | 140         |
| Fresno County   | 107         |
| Fuels   | 15-25       |
| Fuller's earth. ( <i>See</i> Bentonite.)                          |             |
| duty on   | 72          |
| producers   | 130         |
| Gas. ( <i>See</i> Natural gas.)                                   |             |
| Gasoline from natural gas   | 18          |
| Gaylord, H. M., cited   | 32, 47      |
| Gems  | 79-80       |
| producers   | 140         |
| total production  | 80          |
| Glass sand  | 89-90       |
| duty on   | 90          |
| Glenn County  | 108         |
| Gold  | 31-36       |
| nuggets from Sierra County, photo of                              | 34          |
| number of operating properties                                    | 33          |
| principal producers   | 141-147     |
| production by counties, 1937                                      | 33          |
| total production  | 36          |
| value 1887-1937   | 14          |
| Goodyear, W. A., cited  | 16          |

|  | Page   |
|--|--------|
| Granite  | 55-56  |
| decomposed   | 67     |
| producers  | 148    |
| production, 1887-1937                                | 56     |
| varieties of, in California                          | 56     |
| Granules for roofing and stucco                      | 67     |
| Graphite   | 80-81  |
| total production                                     | 81     |
| Gravel   | 65-66  |
| Grinding-mill pebbles                                | 65     |
| producer   | 171    |
| Gypsum   | 81     |
| producers  | 149    |
| total production                                     | 81     |
| Hanks, Henry, cited                                  | 21     |
| Healdsburg gravel plant of Basalt Rock Co., photo of | 65     |
| Hittell, T. H., cited                                | 35     |
| Hollow building tile or blocks                       | 53     |
| Hübenrite  | 49     |
| Humboldt County                                      | 108    |
| Imperial County                                      | 108    |
| Imports of Chromite                                  | 29     |
| Magnesite  | 58     |
| Manganese  | 39     |
| Potash   | 99     |
| Quicksilver  | 44     |
| Talc and soapstone                                   | 91     |
| Tungsten   | 49     |
| Industrial limestone                                 | 82     |
| Industrial materials                                 | 69-93  |
| Infusorial earth                                     | 77     |
| Introduction   | 9      |
| Inyo County  | 109    |
| Iodine   | 97     |
| producers  | 149    |
| Iridium. ( <i>See</i> Platinum.)                     |        |
| Iron ore   | 39     |
| producers  | 149    |
| total production                                     | 37     |
| Jewelers' materials. ( <i>See</i> Gems.)             |        |
| Kern County  | 109    |
| Kernite  | 95     |
| Kieselguhr   | 77     |
| Kings County   | 110    |
| Knudsen, E. T., cited                                | 19, 25 |
| Kyanite  | 90     |
| Lake County  | 110    |
| Lassen County  | 111    |
| Lead   | 38-39  |
| producers  | 150    |
| production, 1877-1937                                | 39     |
| of United States                                     | 38     |
| Lepidolite   | 83     |
| Letter of Transmittal                                | 7      |
| Lime   | 57     |
| producers  | 151    |
| production, 1894-1937                                | 57     |
| Limestone  | 82-83  |
| producers  | 151    |
| production, 1894-1937                                | 83     |
| Lithia   | 83     |
| Los Angeles County                                   | 111    |
| Macadam  | 67     |
| Madera County  | 112    |
| Magnesite  | 58-59  |
| duty on  | 58     |
| imports of   | 58     |
| occurrence of  | 152    |
| producer   | 58     |
| production, 1887-1937                                | 58     |
| Magnesium salts                                      | 97-98  |
| producers  | 152    |
| production by years                                  | 98     |
| Manganese  | 39-40  |
| duty on  | 40     |
| imports of   | 39     |
| total production                                     | 40     |
| Marble   | 59-60  |
| producers  | 153    |
| production, 1887-1937                                | 60     |
| Marin County   | 112    |
| Mariposa County                                      | 112    |
| Medicinal salts                                      | 99     |
| McCaskey, H. D., cited                               | 47     |
| Mendocino County                                     | 113    |

|  | Page           |
|--|----------------|
| Mercantile Trust Review, cited                   | 35             |
| Merced County                                    | 112            |
| Merrill, Charles White, cited                    | 32, 47         |
| Metal & Mineral Markets, cited                   | 27, 28, 42, 49 |
| Metals   | 26-50          |
| Mica   | 84             |
| producers  | 153            |
| Mineral Yearbook, cited                          | 33-34, 46-47   |
| Minerals, county                                 | 13, 102, 127   |
| industry, review of                              | 11-12          |
| output by counties                               | 13             |
| by substances                                    | 12             |
| output, comparative value, 1936-1937             | 12-13          |
| paint  | 84-85          |
| producer   | 153            |
| production, 1890-1937                            | 85             |
| production, 1887-1937                            | 14             |
| water  | 85-86          |
| producers  | 154-155        |
| production, 1887-1937                            | 86             |
| total production of, by years                    | 14             |
| variety of, produced in California               | 12             |
| Mineral Resources West of Rocky Mountains, cited | 31             |
| Mining and Scientific Press, cited               | 22             |
| Mining Bureau Act                                | 175            |
| Miscellaneous stone                              | 63-68          |
| producers  | 166-172        |
| production, 1893-1937                            | 68             |
| Modoc County                                     | 114            |
| Molding sand                                     | 66             |
| Molybdenum                                       | 40-41          |
| duty on  | 40             |
| Mono County                                      | 114            |
| Monterey County                                  | 114            |
| Montmorillonite                                  | 71             |
| Monumental stone                                 | 55             |
| Names of producers in                            | 129-174        |
| Napa County                                      | 115            |
| Natural gas                                      | 16-19          |
| amount produced, utilized, wasted and stored     | 17             |
| distribution by counties                         | 17             |
| gasoline from                                    | 18             |
| production, 1888-1937                            | 18             |
| production and value                             | 17             |
| Nevada County                                    | 115            |
| Nickel   | 41             |
| Nitrates   | 98             |
| Nitrogen, atmospheric, fixation of               | 98             |
| Oil. (See Petroleum.)                            |                |
| in storage                                       | 25             |
| shale  | 88             |
| utilization of                                   | 25             |
| well data  | 23             |
| well drilling mud                                | 76             |
| wells operated by fields                         | 23             |
| Onyx   | 60             |
| Orange County                                    | 116            |
| Osmium. (See Platinum.)                          |                |
| Palladium. (See Platinum.)                       |                |
| Paving blocks                                    | 64             |
| Peat   | 15             |
| Pebbles for grinding mills                       | 65             |
| Petroleum  | 14, 19-25      |
| average price by counties, 1927-1937             | 20             |
| production, 1875-1937                            | 22             |
| production and value by counties                 | 20             |
| production by fields                             | 24             |
| production of light and heavy gravities          | 24             |
| specific gravity of                              | 23             |
| statistics of well operations                    | 23             |
| storage of                                       | 25             |
| value, 1887-1937                                 | 14             |
| yield per day of wells                           | 23             |
| Phosphates                                       | 87             |
| Placer County                                    | 116            |
| Plaster and brick sand                           | 66             |
| Platinum   | 42             |
| prices   | 42             |
| producers  | 156            |
| production of, 1887-1937                         | 42             |
| Plumas County                                    | 117            |
| Porcelain  | 76             |
| Potash   | 98-99          |
| imports  | 99             |
| producer   | 156            |
| total production of                              | 99             |

|   | Page    |
|---|---------|
| Pottery clays                           | 73-76   |
| Publications of State Division of Mines | 180-194 |
| Pumice                                  | 87      |
| producers                               | 87      |
| total production                        | 87      |
| Pyrites                                 | 88      |
| producers                               | 157     |
| total production                        | 88      |
| Pyroxine                                | 88      |
| Quartz                                  | 72      |
| crystals. ( <i>See</i> Gems.)           | 89      |
| Quicksilver                             | 43-45   |
| imports                                 | 44      |
| prices                                  | 43      |
| producers                               | 158-159 |
| production, 1850-1937                   | 45      |
| production of, in United States         | 44      |
| Randol, J. B., cited                    | 45      |
| Red earthenware                         | 76      |
| Riprap                                  | 67      |
| Riverside County                        | 111     |
| Rock, crushed                           | 67      |
| Roofing granules                        | 67      |
| slate                                   | 62      |
| tile                                    | 76      |
| Rubble                                  | 67      |
| Ruthenium. ( <i>See</i> Platinum.)      |         |
| Sacramento County                       | 118     |
| Salinas                                 | 94-101  |
| Salt                                    | 99-100  |
| producers                               | 160     |
| production, 1887-1937                   | 100     |
| Salt Cake                               | 100     |
| San Benito County                       | 118     |
| San Bernardino County                   | 119     |
| San Diego County                        | 119     |
| San Francisco Bulletin, cited           | 21      |
| County                                  | 120     |
| San Joaquin County                      | 120     |
| San Luis Obispo County                  | 121     |
| San Mateo County                        | 121     |
| Sand, glass                             | 89-90   |
| Sand and gravel                         | 65-66   |
| producers                               | 166-172 |
| Sandstone                               | 61      |
| producers                               | 161     |
| production, 1887-1937                   | 61      |
| Sanitary ware                           | 76      |
| Santa Barbara County                    | 121     |
| Santa Clara County                      | 122     |
| Santa Cruz County                       | 122     |
| Scheelite                               | 49      |
| Semivitreous tableware                  | 76      |
| Serpentine                              | 61-62   |
| Sewer pipe                              | 76      |
| Shale oil                               | 88-89   |
| Shasta County                           | 123     |
| Siebenthal, C. E., cited                | 39      |
| Sierra County                           | 123     |
| Silica                                  | 89-90   |
| producers                               | 161     |
| total production                        | 90      |
| Sillimanite group                       | 90-91   |
| producer                                | 161     |
| Silver                                  | 46-47   |
| principal producers                     | 162-163 |
| production by counties                  | 46      |
| production, 1880-1937                   | 47      |
| Siskiyou County                         | 124     |
| Slate                                   | 62-63   |
| producers                               | 164     |
| production, 1889-1937                   | 63      |
| roofing granules                        | 62      |
| Soapstone                               | 91-92   |
| duty on                                 | 91      |
| imports of                              | 91      |
| producers                               | 165     |
| total production                        | 92      |
| Soda                                    | 100-101 |
| producers                               | 165     |
| total production                        | 101     |
| Solano County                           | 124     |
| Sonoma County                           | 125     |
| Spark plugs, andalusite for             | 90      |
| Specific gravities of oil produced      | 23      |
| Spelter. ( <i>See</i> Zinc.)            |         |
| Standard Oil Company, cited             | 20      |

|  | Page   |
|--|--|
| Stanislaus County                                    | 125  |
| State Mineralogist Report, cited                     | 21, 38   |
| list of  | 180-194  |
| Mining Bureau, cited                                 | 37   |
| Oil and Gas Supervisor, cited                        | 19   |
| Steam wells at the Geysers Hot Springs, photo of     | 86   |
| Stone, miscellaneous                                 | 63-68  |
| producers  | 166-172  |
| production by counties                               | 67   |
| production by years                                  | 68   |
| Stoneware  | 76   |
| Strontium  | 92   |
| Structural materials                                 | 51-68  |
| Sulphur  | 92-93  |
| producer   | 173  |
| production by years                                  | 93   |
| Sutter County  | 125  |
| Talc   | 91   |
| duty on  | 91   |
| producers  | 165  |
| Tariff Act of 1930, cited                            | 40, 41, 49, 58, 71, 72, 90, 91                   |
| Tehama County  | 126  |
| Terra cotta  | 76   |
| Tile   | 76   |
| Tin  | 48   |
| Titanium   | 48   |
| Travertine   | 60   |
| Trinity County                                       | 126  |
| Trona  | 100  |
| Tube mill pebbles                                    | 65   |
| Tuff, used for building stone                        | 76   |
| Tulare County  | 126  |
| Tungsten   | 48-49  |
| duty on  | 49   |
| imports  | 49   |
| producers  | 173  |
| quotations   | 49   |
| total production                                     | 49   |
| Tuolumne County                                      | 127  |
| U. S. Bureau of Foreign and Domestic Commerce, cited | 39, 95, 99                                       |
| U. S. Bureau of Mines, cited                         | 19, 25, 29, 30, 32, 33-34, 38, 43, 44, 46-47, 50 |
| Census Bureau, cited                                 | 102  |
| Geological Survey, cited                             | 16, 22, 37, 39                                   |
| Vanadium   | 50   |
| Ventura County                                       | 127  |
| Vitrified brick                                      | 53   |
| Volcanic ash   | 87   |
| producers  | 157  |
| Well data  | 23   |
| Witherite  | 71   |
| Wolframite   | 48   |
| Wollastonite   | 72, 73   |
| Yale, Chas. D., cited                                | 35   |
| Yolo County  | 128  |
| Yuba County  | 128  |
| Zinc   | 50   |
| producers  | 174  |
| production of United States                          | 50   |
| total production                                     | 50   |







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